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71st Annual Meeting, October 31–Nov. 2, 1960
Diplomat Hotel, Hollywood, Fla.

1960

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AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, The Palmer House, Chicago, Jan. 23–28. Mr. John K. Hart, 116 S. Michigan, Chicago 3, Executive Secretary.

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FEBRUARY

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AMERICAN COLLEGE OF ALLERGISTS, INC., Americana Hotel, Bal Harbour, Miami Beach, Fla., Feb. 28–Mar. 5. Mr. Eloi Bauers, 2160 Rand Tower, Minneapolis 2, Executive Vice-President.

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AMERICAN ORTHOPSYCHIATRIC ASSOCIATION, INC., Sherman Hotel, Chicago, Feb. 25–27. Marion F. Langer, Ph.D., 1790 Broadway, New York 19, Executive Secretary.

Congress on Medical Education and Licensure, Palmer House, Chicago, Feb. 7–9. For information write: Council on Medical Education and Hospitals, American Medical Association, 535 N. Dearborn St., Chicago 10.

SOCIETY OF UNIVERSITY SURGEONS, Minneapolis, Feb. 11–13. Dr. Ben Eiseman, 4200 E. Ninth Ave., Denver 20, Secretary.

SYMPOSIUM ON FUNDAMENTAL CANCER RESEARCH (14th), University of Texas, Houston, Feb. 25–27. For information write: University of Texas M. D. Anderson Hospital & Tumor Institute, Houston 25, Texas.

MARCH

AMERICAN BRONCHO-ESOPHAGOLOGICAL ASSOCIATION, Deauville Hotel, Miami Beach, Fla., Mar. 15–16. Dr. F. Johnson Putney, 1712 Locust St., Philadelphia 3, Secretary.

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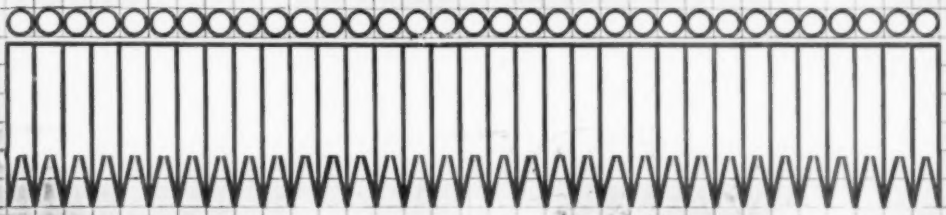

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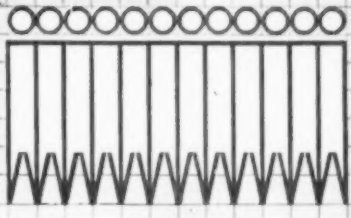

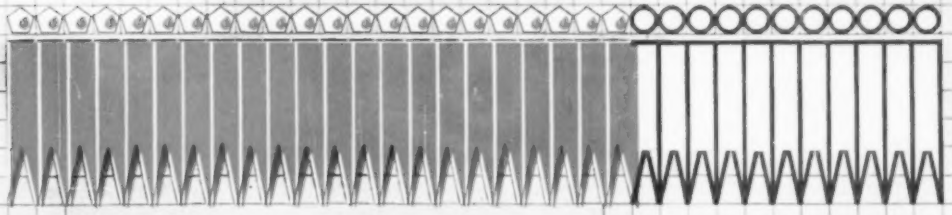

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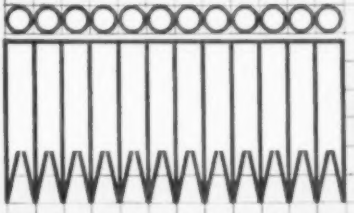

1. Boland, E. W., and Headley, N. E.: Paper read before the Am. Rheum. Assoc., San Francisco, Calif., June 21, 1958.
2. Bunim, J. J., et al.: Paper read before the Am. Rheum. Assoc., San Francisco, Calif., June 21, 1958.

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1. Moser, K.M.: J.A.M.A. 767:1695 (Aug. 2) 1958.
2. Cliffton, E.E.: J. Am. Geriatrics Soc. 6:118, 1958.
3. Sussman, B.J., and Fitch, T.S.P.: J.A.M.A. 767:1705 (Aug. 2) 1958.
4. Singher, H.O., and Chapple, R.V.: Clin. Med. 6:439 (March) 1959.

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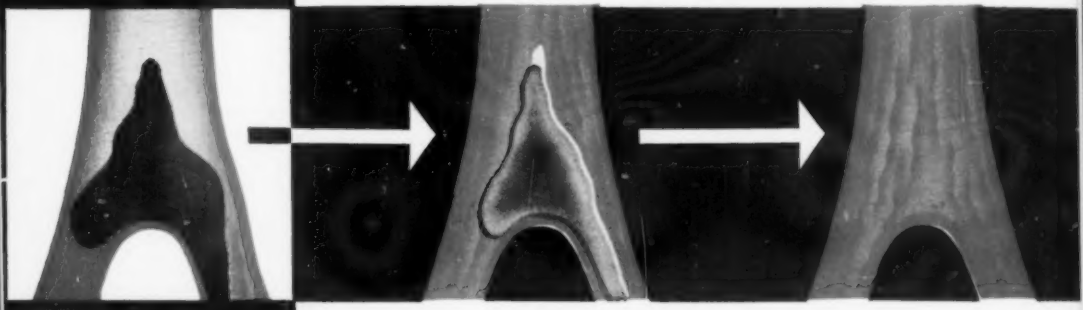

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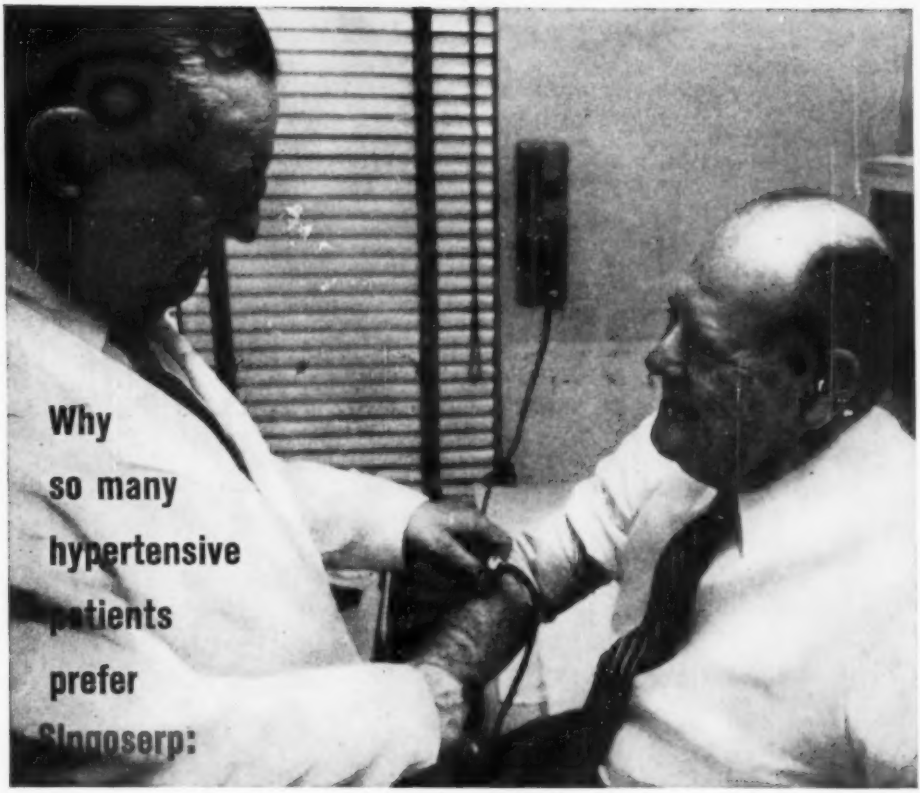

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*Herrmann, G. R., Vogelpohl, E. B., Hejtmancik, M. R., and Wright, J. C.: J.A.M.A. **169**:1609 (April 4) 1959.

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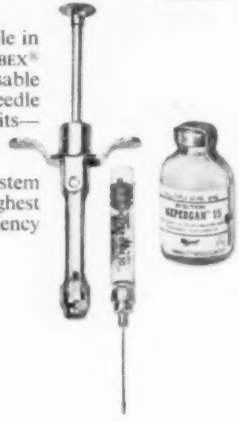

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The Journal of MEDICAL EDUCATION

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CONFERENCE ON EXPERIMENT IN MEDICAL EDUCATION

Foreword

The first Conference of the Association for the Study of Medical Education was held at the Royal College of Physicians in London on 25th and 26th September, 1958. The subject was "Experiment in Medical Education."

The Association was founded at the end of 1957 and has the following purposes:

1. To exchange information about medical education.
2. To organize meetings on topics concerning medical education.
3. To maintain a bureau where information about medical education can be received, stored, and made available.
4. To encourage, promote, or conduct research into matters concerned with medical education.

There has never previously existed in Great Britain any organization capable of fulfilling these aims, or of bringing together to solve problems in the educational field the varied views of the Universities, the Royal Colleges which represent professional practice (and also play their part in the maintenance of educational standards), and other interested bodies such as the Ministry of Health and the General Medical Council.

The Association has been warmly welcomed, and almost all medical schools and licensing bodies in the United Kingdom, and many in the British Commonwealth, have joined it as Corporate Members. It has also been supported by a large number of teachers of all branches of Medicine who have joined as Individual Members. The Association now owes much to generous support from the Rockefeller Association. It is grateful also for assistance from the Commonwealth Fund of New York.

The first Conference was held under the general Chairmanship of Sir Robert Platt Bt., Chairman of the Association and President of the Royal College of Physicians. Individual sections met under the Chairmanship of Sir James Paterson Ross, President of the Royal College of Surgeons; Dr. J. G. McCrie, Vice-Chairman of the Association and Dean of the Faculty of Medicine, University of Sheffield; and Sir Russell Brain Bt., Past President of the Royal College of Physicians.

The Conference was generally considered to be valuable—and it is much regretted that publication of the full discussions is impossible. Publication of the main proceedings is possible through the courtesy of *The Journal of Medical Education*.* The Executive Council of the Association are happy to have this opportunity of thanking the Editorial Board of the *Journal* and the Association of American Medical Colleges most warmly for this generous and friendly gesture.

The Executive Council also wishes to take this opportunity of paying a tribute to the speakers from the United States of America and from Sweden who did so much to make this Conference successful.

J. R. Ellis
Secretary, A.S.M.E.

* The papers presented by Sir Russell Brain and Dr. Lester Evans have been published previously in *The Lancet* and are not herewith reprinted.

The Study of Medical Education in the United States

JOHN Z. BOWERS, M.D.*
University of Wisconsin, Madison 6, Wis.

Medical faculties are generally considered to be the most dynamic force in education in the United States today. About 90 per cent of our medical schools have some aspect of the educational program under study. Other segments of our universities watch with interest, and often envy, the manner and intensity with which medical schools are studying education. But it was not always so! During the 19th century and the first third of the present century, medical schools were usually the unwanted, uninspired affiliates of universities. Why has there been such a change? A look at history is always helpful.

History.—The *colonial period* of medical education in the United States was represented by a few schools which, as their parent universities, catered to the aristocratic segment of society. The "English pattern for the training of a gentleman" was the model for our universities. Edinburgh and London were important parts of the pattern for our medical schools. The number of graduates was limited, and quality was the watchword.

Then came the *Dark Ages*. Quantity became the watchword. The United States was growing rapidly; the frontiers were pushing West, and the major concern was to have large numbers of medical practitioners. Standards at the good schools were lowered. New schools opened which in essence had no standards. Training was by precept; lectures were few. Medical schools were operated as money-making ventures, and an applicant only needed to show a bit of reading, a bit of writing, and the necessary money. Laboratory teaching was almost nonexistent in these proprietary schools. The number of schools soared. In 1800, the U.S.A. had *five* medical schools, in 1860, *66* medical schools, and in 1900, *160*.

The next period was the *Reformation*, which was led by Abraham Flexner. His attack on the existing order was abetted by a growing discontent on the part of the universities and the medical profession. In this discontent, Europe played a part, since the scientific developments on this side of the Atlantic were carried home by postgraduate students from the United States who had studied here. These pioneers endeavored to introduce physiology, bacteriology, and histology as laboratory courses, but in many instances they were thwarted by the lack of funds.

The medical leaders in the U.S.A. were conscious of the lowly status of the majority of the medical schools, but they were unable to effect the necessary changes. Thus, they sought the study by Flexner. It is fortunate that Flexner was not a physician and that he had never taught in a medical school. He could be completely objective in his study and completely candid in his report.

Perhaps a few excerpts from the Flexner report will reflect the state of medical education in our country in 1910:

"(1) For twenty-five years past there has been an enormous over-production of uneducated and ill trained medical practitioners. This has been in absolute disregard of the public welfare and without any serious

* Dean, University of Wisconsin Medical School.

thought of the interests of the public.

"(2) Over-production of ill trained men is due in the main to the existence of a very large number of commercial schools, sustained in many cases by advertising methods through which a mass of unprepared youth is drawn out of industrial occupations into the study of medicine.

"(3) Until recently the conduct of a medical school was a profitable business, for the methods of instruction were mainly didactic" (3).

The Flexner Report precipitated the widespread adoption of rigid, detailed regulations by the licensing groups. For a time these were beneficial in raising standards in all medical schools. However, in fifteen years, the Commission on Medical Education reported that "the volume and diversity of these regulations and especially the binding character of some of the legal requirements led to great rigidity and overcrowding of the curriculum." The enormous increase in knowledge of the diagnosis, treatment, and prevention of disease stimulated faculties to add new subjects and examinations "on an already overburdened curriculum" (1).

Representatives of some of the leading medical schools and their affiliated universities were deeply concerned that restrictions by licensing and accrediting groups might seriously impede the development of sound medical education. In 1925 it was agreed, in a treaty between the licensing groups and medical educators, that medical schools would be allowed to experiment in medical education without penalty to their graduates. Until World War II the majority of our medical schools did not have sufficient funds, faculty, or facilities to take full advantage of this agreement. Since World War II, however, the number of schools undertaking the study of medical education has increased rapidly.

Attitude of the regulatory agencies.—The attitude of the regulatory bodies has been to encourage the study of medical education. The most recent statement of these groups sets forth this attitude in clear terms. "No rigid curriculum can be prescribed for accomplishing the objectives of medical education. On the contrary, it is the responsibility of the faculty of each school continually to re-evaluate its curriculum. Each school should utilize those methods and approaches that the particular interests and abilities of the faculty indicate would provide the most effective education.

"The traditional emphasis on lectures, demonstrations and amphitheater clinics in which the student is passive has shifted to greater use of individual student and small group conferences.

"Unscheduled time for reading is desirable" (4).

The influence of research.—Scientific research has been the dominant theme in our medical schools since World War II. Research ability is essential for a faculty appointment in a majority of the schools. The *pressure* for research productivity permeates the activities of our faculties. Sometimes it seems to be more important to get it written then to get it right.

The road leading to a faculty appointment in a *clinical* department wends its course through biochemistry, biophysics, and immunology. Preparation for an academic career as a clinical teacher usually includes one or more years of acquiring skills in a basic science.

There is no reason to believe that this situation will change in any direction but toward ever increasing emphasis on research. The American public is devoted to medical research, and the funds made available are staggering. Our main concern is the limitation on qualified investigators rather than money.

The Clinical Clerkship.—Increasing responsibility in the student is a dominant theme in our clerkship program, including participation in diagnostic and therapeutic procedures. Uninterrupted clerkship time is a second note. In many of our medical schools, the students have the hours from 9 to 4 for ward work. In discussing the patient, a constant effort is made to introduce

the altered physiological and biochemical relations.

Teaching from the ambulatory patient.—With the widespread adoption of the clinical clerkship as an integral part of medical education, faculties next directed their attention toward the most effective use of the ambulatory patient. The situation was ripe for study. Medical students spend about half of their clinical training in out-patient departments, often engulfed in waves of patients, with little opportunity to study disease. The emphasis has been on the ward clerkship as the domain of the professor, while the out-patient program has often been an educational Siberia for the faculty and the student.

The growing interest in teaching from the ambulatory patient coincided with an apprehension on the part of many medical educators that, in our concentration on scientific medicine, we had forgotten that medicine was really designed to take care of individuals. In our concentration on scientific medicine, we had forgotten the impact of personal, economic, sociological, and cultural factors. It was only natural that the ambulatory patient should be used as the focus for the development of this broader approach to medicine. The comprehensive clinic and the family care clinic came into being and have served as interesting opportunities for current studies in medical education.

Fortunately, this development occurred at a time when many medical educators had become increasingly aware of the potential contribution of other disciplines of the university. In addition, sociologists, psychologists, anthropologists, and general educators have been challenged by the opportunity which the teaching hospital presents for the study of people. In a number of institutions forces have been joined and new approaches and techniques for objectively evaluating the educational process brought to bear on medical education.

The internship.—The shift toward increasing student responsibility in the clinical years has, of course, had a direct effect on the functions of the internship in teaching hospitals. Our medical students have assumed many of the former responsibilities of our interns, and the role of the internship in medical education is now coming under careful study. Interns are often drawn into an educational vacuum between the senior medical student and the resident, and it is predicted that the days of the internship are numbered. This problem is the focus of a current study by the Association of American Medical Colleges.

Another factor which occasions concern about the internship is apprehension as to the length of medical education in the United States. A majority of our medical students have completed 4 years of college. An additional 4 years of medical school, 1 year of internship, and 3–5 years of specialty training is a long road. Fusion of the senior year and the internship, fusion of the basic science program with a part of the premedical program, or some reduction in the period of residency training are three solutions that are discussed. The coming years will see an ever increasing interest and study of this problem.

How many doctors?—There are 78 4-year medical schools in the United States today, four schools offering only the basic medical sciences, and three schools under development. The size of the graduating group has increased steadily to 6,850. A challenging problem is the determination of "how many doctors will the medical schools need to produce in 1970?" At that time it is predicted that our population will have increased to 220 million. To maintain our present physician-population ratio under the existing circumstances of medical care, we will need to produce at least 2,000 additional physicians annually—or 25 new medical schools. It requires 8–14 years from the decision to establish a medical school until the first class is graduated and intern and residency training have been completed. This is a difficult problem, since existing schools have already expanded enrollments to the maximum. Can a medical school do a good job with classes of 200 students? I believe that the Federal government will need to make funds avail-

able for the construction of new facilities in new schools and in existing schools. Many of us envy the United Kingdom's situation of unconcern as to the demands of producing increasing numbers of physicians. In the United States, it is a very difficult problem for our medical schools.

Supply of patients.—The soaring economy of the United States, the widespread adoption of voluntary health insurance, and the construction of innumerable community hospitals have raised problems concerning an adequate supply of teaching material in some of our medical schools. In an increasing number of our schools the private patient is the major focus for teaching. I have been greatly impressed by the diversity and volume of clinical material that is available for the medical schools in Great Britain.

The medical student.—There is general agreement that good medical students in the presence of a good faculty will become good physicians. In the United States the background, preparation, selection, progress, and achievement of the medical student are being studied.

As a part of the mid-century survey of medical education in the United States by Deitrick and Berson (2), a team led by Severinghaus reviewed the programs for premedical students in our liberal arts colleges and recommended desirable changes. The excellent report of this study pointed out that there was too much emphasis on amassing a large number of science courses and too little attention to the social sciences and humanities. The intense competition among premedical students was not felt to be conducive to an atmosphere of sound higher education. Now the same team is resurveying preparation for medical education as an evidence of our continuing concern about the problem.

As a result of the first survey, there has developed a greater interest in broadening the base of premedical education. Relations between the liberal arts colleges and the medical schools have been strengthened. A number of our liberal arts colleges have developed premedical advisory committees which offer a careful evaluation of the applicant for the use of medical school selection committees.

The selection process for medical students has been the object of careful study during recent years. In general, the academic record is the primary consideration. Almost all our medical schools require applicants to complete the Medical College Admissions Test, which is sponsored by the Association of American Medical Colleges. Four areas are covered in the test—modern society, verbal ability, quantitative ability, and science.

A third approach, which finds a varying reception, is the interview. Some schools place great emphasis on the interview, while others have little faith in it as a crucial factor in selection. There is a need for skilled interviewers if reliance is to be placed on this method. For example, in one unpublished study by recording interviewers it was observed that the faculty member often dominated the conversation. It was difficult to know who was interviewing whom. Further, a significant portion of the interview consisted of asking questions that had been previously answered in the application blank. At times, the central point of the interview was the research field of the faculty member rather than the background of the applicant (5). It would be interesting to listen to similar recordings from other schools.

A recent Teaching Institute of the A.A.M.C. set forth three major values of the interview: (*a*) It allows an admissions committee to clarify information. (*b*) It affords the student an opportunity to explain aspects of his application and to learn about the school. (*c*) It may give information not available in the student application form.

The evaluation of the progress of medical students through the curriculum is an interesting area for experimentation in medical education. There is, as many of you know, a difference between methods of evaluation in the United States and the United Kingdom. We emphasize a continuing evaluation of the student, and in most of our schools the final examination represents no more than 30 per cent of the estimate. A student who

has performed satisfactorily in his daily program could fail a final examination and still pass the course. Unquestionably our method places continuing pressure on the student, and perhaps their greater maturity permits this. In many schools, we do avoid the agonizing ordeal of the final examination on which success or failure is based.

Encouragement to experiment in medical education.—As indicated earlier, the attitude of the Association of American Medical Colleges (A.A.M.C.) and the Council on Medical Education and Hospitals has been to foster—indeed to require—a continuing evaluation of the educational process. The A.A.M.C. sponsors annual Teaching Institutes in which faculty representatives convene to discuss educational methods and means by which they may be evaluated and improved. The basic medical sciences, the student, and, now, teaching in the clinical years have come under scrutiny. These national faculty meetings have played a vital role in the progress of medical education in the United States. They might well be considered as a development for A.S.M.E.

The A.A.M.C. publishes a journal which reports significant developments in medical education. It is distributed to faculty members in the United States and abroad.

The annual meeting of the A.A.M.C. is a stimulating forum for the exchange of ideas on the advancement of medical education. It has developed from a meeting of deans to a group that includes many faculty members who are interested in medical education.

The Council on Medical Education and Hospitals of the A.M.A. has for many years held a distinguished role in the progress of medical education in the United States. The members of the Council are elected by the House of Delegates of the A.M.A. At the turn of the century the concern of this Council for the low state of medical education occasioned a request to the Carnegie Foundation for the study by Abraham Flexner. Through a Liaison Committee, the A.A.M.C. and the Council visit medical schools to review and accredit programs. The Council approves intern and residency programs in our teaching hospitals. It establishes and applies standards for educational programs in the health sciences.

The annual Congress on Medical Education and Licensure sponsored by the Council serves as a platform for the consideration of current and anticipated problems and programs in these areas.

Scientific versus clinical methods.—In the United States, the emphasis in teaching is on the application of the basic sciences in clinical medicine. Undoubtedly, in many instances our concern for this approach to medical education results in too little attention to the art of clinical medicine. It has been interesting to observe that in the British schools the emphasis is frequently on the clinical art, with less concern for the scientific approach. Perhaps the best medical education would develop through a blend of the British emphasis on clinical art and the United States emphasis on the scientific approach. Whether we emphasize the art or the science, the great challenge in medical education is to study and experiment with the system. Perhaps this is best expressed in the words of Sir Humphrey Davy, which I read on a plaque at Cambridge. "In the progress of an art from its rudest to its most perfect state, the whole process depends upon experiments."

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A Study of Medical Education in Great Britain*

SIR GEORGE PICKERING, M.A., M.D., F.R.C.P.†
University of Oxford, Oxford, England

To clear my conscience, I would wish you to understand the nature of my contribution to this discussion. I have not made an exact study of medical education in this country, nor can I be sure that all the information I give you is strictly up to date. However, I have had, I suppose, a unique opportunity of becoming closely acquainted with all the medical schools in the country since the war through service on the University Grants Committee. What I have to say is thus in the nature of a clinical impression, based on interest and familiarity rather than detailed investigation.

The title of this general discussion is very happily chosen, and I would like to begin by making one or two general remarks on experiments in education. In the scientific sense, experiment is controlled observation. One, or possibly more than one, factors are varied by known amounts, and the effects of these variations estimated. Experiments in education present two formidable difficulties, namely, assessment of results and difficulty in controlling, and indeed recognizing, the factors concerned.

First we may consider assessment of results. What, in fact, are the objects of education, and how can an assessment be made of the extent to which these objects have been achieved? I would define the objects of education as twofold: first, to train the student's mind so that he acquires method—method in collecting facts, verifying them, arranging them, drawing conclusions, and testing these conclusions; and, second, to become familiar with the material with which he proposes to work, and, in the case of a practical art, an acquaintance with the elements of current practical technique. The first is common to all education, the second peculiar to each faculty and its subdivisions. The results of education can be assessed immediately by examination or similar test or, over a longer period, by the achievements of its graduates. Now I have had the privilege of examining for the Universities of Oxford, Cambridge, London, Aberdeen, Birmingham, and Manchester, and I can thus state, from a representative experience, that at least until recently our University faculties of medicine have shown by their examination papers that they were not really interested in training the student's mind but rather in his familiarity with the material of his subject and its practical handling. I base this statement on the absence of choice of questions, and the nature of the questions set. To illustrate this I show the papers in medicine, surgery, and midwifery in the Oxford final B.M. for the term before I went to Oxford. I have chosen these, because they were the last papers set by examiners whose names are not automatically known to me. They are thus to me anonymous and in fact are representative of British University practice.

Principles and Practice of Medicine

1. What are the anatomical relations of the left kidney? How may a calculus in that kidney present clinically?
2. Discuss the causes of persistent headache of 4 weeks' duration.
3. A woman aged 50 complains of "attacks

* Address given to the Association for the Study of Medical Education, September 25, 1958.

† Regius Professor of Medicine.

of palpitations." Discuss the differential diagnosis and the investigations which may be necessary to establish the diagnosis.
4. Describe the clinical features of abortus fever (brucellosis) and discuss the differential diagnosis.
5. What factors would influence you in advising medical treatment for a patient who has a duodenal ulcer?
6. What may be the symptoms and signs of acute leukaemia in a child? Discuss the diagnosis.

(Time allowed 3 hours: 5 questions to be answered)

Principles and Practice of Surgery

1. Describe the right ureter, and give its relations in the male and female.
2. Describe the diagnosis and treatment of Colles's fracture.
3. Describe the diagnosis and pathology of carcinoma of the stomach.
4. Discuss the diagnosis and pathology of enlargement of lymphatic glands of the neck.
5. Describe the pathology, diagnosis, and treatment of intussusception in a child.
6. Describe the treatment of infections of the finger.

(Time allowed 3 hours: 5 questions to be answered)

Midwifery and Diseases of Women

1. Describe the anatomy of the vagina, and give its anatomical relations. What conditions may cause ulceration of the vagina?
2. A primigravida is admitted to hospital at the thirty-fourth week of pregnancy complaining of abdominal pain and vaginal bleeding. How would you investigate and treat the patient?
3. Give an account of the pathology of benign ovarian cysts, and discuss the symptoms to which they may give rise.
4. Describe the diagnostic signs of a persistent occipito-posterior position in the second stage of labour, and briefly outline your management of the delivery.
5. Discuss the causes of intra-cranial haemorrhage in the newborn baby. How would you diagnose and treat the condition?
6. Describe the causes, symptoms, and treatment of chronic cervicitis.

(Time allowed 3 hours: 5 questions to be answered)

Surgery is straightforward, as surgeons should be—six questions which the pictorial memory can easily recall from the pages of the textbook. Midwifery is seemingly more complex, but in fact only question 2 demands other than a textbook account. In Medicine questions 3 and 5 require thought, the remainder are textbook. Professor Smart has sent me, since the meeting, the appended paper for Newcastle for 1903. It is clear that the views of clinical teachers on the purpose of education have not greatly changed in 50 years.

Principles and Practice of Medicine and Psychological Medicine

1. Review the etiology of Pyelitis, and describe the symptoms, diagnosis, and treatment of the condition.
2. Give a description of Tinea Favosa, and state how this disease is to be distinguished from Tinea Tonsurans. Give the treatment of Tinea Favosa.
3. Describe the causation and symptoms of Locomotor Ataxia, and give the diagnosis and treatment of the condition.
4. Give the physical signs and symptoms of a case of Fungating Endocarditis of the Aortic valves and the various complications which may result.
5. Classify the more important Tumours which may occur in the abdomen, and give their differential diagnosis.
6. Describe a case of Melancholia. Give both the bodily and mental symptoms, and detail the circumstances which would make you decide to send the case to an asylum.
7. What is meant by Delusional Insanity? Describe any case you may have seen or read about.

(Time allowed 3¼ hours: 6 questions to be answered)

It has been suggested that it would be helpful to show what I think should be done about examination papers. Many years ago the Science Masters Association pointed out that examinations should seek to find out two things, first, the candidate's knowledge of the facts and, second, his ability to arrange and interpret data. The kinds of questions needed to test these abilities are quite different. Here are two papers from the final M.B. examination in the

University of Manchester, which try to separate these objectives. Professor Robert Platt has kindly allowed me to quote them.

Medicine, I (Time allowed 3 hours: all questions to be answered)

1. Describe the immediate treatment you would employ in a man aged forty who has developed a severe myocardial infarction of three hours' duration, whose pulse is regular at 60 per minute, and whose systolic blood pressure is 80 mm. Hg, and who has no congestive failure.
2. What in your opinion are the five principal ways in which cancer of the bronchus may present?
3. Define homonymous hemianopia. Where is the lesion?
4. Define the Argyll-Robertson pupil. Where is the lesion?
5. Name three conditions in which venesection may help the patient.
6. Define these terms: dyspnoea, stupor, retrograde amnesia.
7. What in your opinion are the *five* commonest conditions causing loss of weight as a presenting symptom?
8. Define Menière's syndrome. Where is the lesion?
9. Tabulate, in order of importance, the symptoms and signs of chronic meningococcal septicaemia.
10. Tabulate the most important features of Weil's disease (Spirochaetosis icterohaemorrhagica).
11. Enumerate the main diagnostic features of subacute bacterial endocarditis.
12. Describe the treatment of acute pyelonephritis.
13. What would make you suspect that a patient has agranulocytosis and how would you confirm your suspicions? What drugs may cause agranulocytosis?
14. Describe the main diagnostic features of mumps. What is the incubation period? Enumerate the chief complications.
15. In the case of an adult with jaundice what diagnostic features would be in favour of infective hepatitis?

Medicine, II (Time allowed 3 hours: essay on one subject only)

1. The epidemiology of coronary artery disease and the relationship of its symptoms to its pathology.
2. The complications of diabetes mellitus and their pathogenesis.
3. The mode of action of the medical and surgical treatments now available for thyrotoxicosis, with an appraisal of their advantages and disadvantages.
4. The role of the doctor in causing disease and disability.
5. The investigation and treatment of headache.
6. The use and abuse of antibiotics.

Examinations for medical degrees in general tend to test factual knowledge, or alleged factual knowledge, and are designed to cover the field. I say alleged factual knowledge, for, as we all know, much of what our teachers taught dogmatically has since been shown to be wrong. With very few exceptions the papers are not designed to test the student's ability to arrange or evaluate evidence or his appreciation of method. Without any exception known to me the types of examination papers set for medical examinations have been quite different from those that are set in honors examinations, at least in our ancient Universities.

This conclusion, to which I come right at the outset, is I think the most important and the most disturbing of all the considerations I shall put before you. For I think it has been a repeated criticism of our medical curriculum that whatever else it has done it has failed as an education, using education in the sense of improving the mind as an active instrument rather than as a mere passive receptacle. And at once we meet the suggestion, arising from the type of papers we ask our students to answer in their examinations, that many, perhaps most of our teachers have not thought this important, in practice, whatever they may say about it in theory. This conclusion is quite basic to any consideration of experiment in education. We may juggle with the content of the curriculum, the integration of its subject matter horizontally or vertically or both, we may introduce new forms of teaching such as discussion groups, etc., we may encourage lectures

or abolish them; all this will be of no avail if the attitude of the teacher remains unchanged. These were Charles Darwin's experiences as a medical student at Edinburgh University in 1825: "The instruction at Edinburgh was altogether by Lectures, and these were intolerably dull, with the exception of those on chemistry by Hope; but to my mind there are no advantages and many disadvantages in lectures compared with reading. Dr. Duncan's lectures on Materia Medica at 8 o'clock on a winter's morning are something fearful to remember. Dr. Munro made his lectures on human anatomy as dull as he was himself, and the subject disgusted me. It has proved one of the greatest evils in my life that I was not urged to practice dissection, for I should soon have got over my disgust; and the practice would have been invaluable for all my future work."

In recent years there is evidence that the attitude of the teachers is changing, one of the pieces of evidence being change in the form of examinations. But it is not changing fast enough. And I think the best way of accelerating the change is to emphasize and reemphasize the need for it at meetings such as this. And, as an earnest of this, I would suggest that we look at our examinations to see whether we know what aspects of the student mind we want to test and whether we are in fact doing so. It is really quite extraordinary how little attention we teachers have paid to the objectives and form of examinations when in fact examinations are the chief outward manifestation of our purpose, and when they determine not only the individual fates of our students but also their attitude to what they feel impelled to learn.

As a test of an education all would agree that examinations are of limited value, and that a man's contribution to his profession and to the community is a more important index of his worth. This, however, is affected by other factors than education, and is very difficult to assess. Beyond emphasizing its importance I shall say no more about it.

The second difficulty in conducting an experiment in education is to know precisely what factor or factors are being changed. Thus, research into the performance of groups of factory workers has shown that the very fact of change in working conditions has a profound effect on productivity. It would seem not improbable, therefore, that if a University or Medical School decides to conduct an experiment in medical education and if this experiment is sensibly planned, then the enthusiasm that is aroused in the teachers will be an important, perhaps the most important, factor determining success or failure.

Since we have visitors from abroad, perhaps I had now better give an outline of the stages through which an average medical student is processed in this country. I use the word "processed" quite deliberately. Before entry, and while still at school, he has to pass an examination which used to correspond to matriculation, that is to say to the academic minimum for University entrance. Passes are required in about five subjects of which one is always English, one mathematics, and one a language. Latin is compulsory at Oxford and I believe still at Cambridge. Most faculties now require in addition two passes at advanced level in special subjects relevant to the subject matter of the faculty concerned. The standard of these subjects is about that required in the past after 1 year's University study and as a rule is reached after 2 years' study at school. It is important to point out that the Universities criticize the schools for early specialization, to which the schools rightly reply that they are equally opposed to this, but that they have to fulfill the requirements demanded by the Universities. I would unhesitatingly place the responsibility for early specialization at school squarely on the shoulders of the University.

At all Universities, the student is required to pass an examination (in most called the first M.B.) in Chemistry, Physics, and Biology, and must satisfy the examiners in each subject separately. The Scottish Universities require a year's study in these subjects at the University irrespective of the

standard reached at school. If the student has come from a good school the work is repetitive, and he begins his University work by being bored. At the other extreme is Cambridge, where Colleges require that the student shall have passed the 1st M.B. before entry. The medical course proper now begins with Anatomy, Physiology, and Biochemistry, and, in some Universities Organic Chemistry, in which at Oxford and Cambridge the student must separately satisfy the examiners. Anatomy, Physiology, and Biochemistry usually last five terms (of 8–10 weeks; there are three terms a year), after which is the stiffest examination in the student's career, the 2d M.B. (in Oxford 1st B.M.). Pharmacology and Pathology are transitional subjects. At Oxford and Cambridge they are taught together and alone, and sandwiched in between Anatomy and Physiology and the Clinical course. In London Pharmacology is taught with Physiology, Pathology with clinical work. In other Universities both Pharmacology and Pathology are taught with clinical work. Most Universities now have examinations in Pharmacology and Pathology. The clinical course lasts 3 years, which may follow Pharmacology and Pathology or be concurrent. It usually begins with an introductory course in clinical methods lasting from 3 weeks to 3 months, followed by three monthly periods of clerking and dressing, of which at least 6 months are devoted to medicine, 6 months to surgery, and 6 months to obstetrics and gynecology. In clerking and dressing, students are allocated to a chief, whose patients they examine and record the findings in the notes. Above five students are allocated at a time in England, larger numbers in Scotland. Before he is through he must satisfy the examiners separately in Forensic Medicine and Public Health, Medicine, Surgery and Midwifery, and, in some Universities, Pediatrics.

In a review of this kind I cannot deal in detail with every part of the curriculum. However, to a detached observer, which I like trying to be, three things must be obvious about such a course: its length, its complexity, and the rigor of its examinations. In Oxford before a man obtains his first medical degree of B.M., he must satisfy the examiners in no less than fourteen subjects separately, namely, Chemistry, Physics, Biology, Organic Chemistry, Anatomy, Physiology, Pharmacology, General Pathology, Special Pathology, Forensic Medicine, Public Health, Medicine, Surgery, and Obstetrics and Gynecology. To give you an idea of the complexity of the technical tricks, with which the student may be asked to be familiar, let me show you the practical Organic Chemistry paper recently set for the Oxford B.M.

Practical Organic Chemistry

1. M is a solution of a base in an alcohol. Slowly distil the whole mixture and collect three fractions, using an air-condenser for the third fraction. Record the boiling-point range of each fraction.

   Discover whether the first fraction is *n*-propyl or *iso*propyl alcohol.

   Convert about a third of fraction 3 into acetyl derivative; recrystallize the derivative and take the melting-points of the base and the acetyl derivative.

   Leave labeled specimens of fraction 1, the base, and the acetyl derivative.
2. Examine the substance S, assign it to its class, and identify it if you can.

The hazards of such a course are obvious, namely, that the subjects are taught in isolation from one another, that the courses are hurried in an attempt to cover the ground, and that it is no one's function to educate; all are concerned with instruction. Is it a wonder that the student has emerged from the average medical course with a mind less good as an active instrument of precision than he had when he started. To quote the report of the College's Committee on Medical Education: "We are agreed that, quite apart from lack of character and ability that may be avoided by improved recruitment and selection, the average medical graduate has defects which are to be attributed chiefly to the manner of his training. He tends to lack curiosity and initiative; his powers of observation are relatively undeveloped; his

ability to arrange and interpret facts is poor; he lacks precision in the use of words. In short, his training, however satisfactory it may have been in the technical sense, has been unsatisfactory as an education. This is a matter of very great importance. The average student leaves his medical school at about the age of 25; during the subsequent thirty or so years of professional life, his ability to learn from his own experience and that of others and to keep abreast of the stream of advancing medical knowledge, depends entirely on those qualities in which his training has left him defective."

Before being placed on the Medical Register the young graduate, who may alternatively hold the diploma of a Royal College or Society of Apothecaries, whose courses are similar, has to serve satisfactorily for at least 1 year in resident posts as house physician and house surgeon in a recognized hospital. After this begins his postgraduate training proper, largely a series of hospital posts which may lead to general practice, to research and teaching, or to consulting work in one or other specialty. Each region of the Health Service has a director of postgraduate studies whose function it is to supervise training posts and postgraduate work in general in the region. In addition there are courses of instruction suitable for postgraduates given by the Post Graduate Medical Federation of London University, by the University of Edinburgh, and other Universities. As regards postgraduate education, I would just like to say this: that its existence is of great satisfaction and importance: that it is yet in its infancy: and that before long it will need to be critically reviewed with the object of defining its purpose and seeing whether that purpose is being achieved.

The chief conclusion to which I come from this brief survey of Medical Education in Britain is that, while it achieves its object of making the student familiar with the subject matter with which he will have to deal later in his career (though some revision here is desirable), its chief failure is in training his mind. The fault lies partly in the curriculum and partly in the teachers. The fundamental fault is, however, the attitude of mind of the teachers, for after all the curriculum is man-made, and the teachers have made it, and are making it. I would ask my colleagues assembled here most sincerely to search their minds and ask themselves: just what are we trying to do for the minds that have been entrusted to us; and are we doing it?

The gloom is not unrelieved. At Oxford and Cambridge all students are required to read for honors; at London and some other Universities, the best students are encouraged to take an extra year to do an Honours B.Sc. During the four terms for the final Honour School of Physiology at Oxford and the year for Part II of the Tripos at Cambridge or a B.Sc. elsewhere, the student reads the original papers, performs for himself many of the classical experiments, and for the first and only time in his undergraduate career learns how the fabric of knowledge has been built up. At their best, and we in this country fortunately still have one of the most distinguished schools of physiology and biochemistry, these Honours courses are probably unsurpassed anywhere as educational instruments. Oxford has the additional advantage of the tutorial system by which each student spends at least 1 hour a week presenting to his tutor an essay or other work which he has prepared for him. This is not a new method in education; it is a very old one that is in danger of being lost. It can be epitomized in what I would regard as a fundamental principle, namely that in true education the student does the work.

To complete my survey I must refer briefly to the changes that have been effected since the last war. Before that time, the didactic approach to medical education was determined at least in part by the shortage of teachers. In all schools except Oxford, Cambridge, and University College London, teachers in the preclinical departments were so few that they had little time for research or for other than didactic teaching. In all the teaching hospitals, the senior staff were unpaid, and junior staff were barely sufficient

for dealing with clinical routine. Teaching was a sideline, and research virtually nonexistent. Since the war the situation has vastly improved. In the first place the government has become aware of the importance of investing in University education. The Universities have received greatly increased financial aid, so that now about three-fourths of their budgets come from the Treasury via the University Grants Committee. The National Health Service has come into being, and the staffing of hospitals, particularly teaching hospitals, enormously improved, both in the senior and junior grades. The chief results of the increased staffs have been as follows. All staff, both preclinical and clinical, of teaching institutions now have ample time for research and for thoughtful teaching. New Chairs have been founded, in the preclinical field chiefly in Biochemistry and Pharmacology; in the clinical field full-time Chairs of Medicine, Surgery, Midwifery, various branches of Pathology, Social Medicine, Psychiatry, and Pediatrics. Thus all Universities and most Medical Schools of the University of London now have clinical departments whose primary function is to advance their subject by research and teaching. These changes, almost wholly admirable, have had one minor defect, namely, that the establishment of a new department under a Professor has often been followed by demands for more of the student's time, supplemented by an examination. In my more "puckish" moments I sometimes think that there should be a society for protecting medical students from Professors.

The third great change is the enlightened new regulations of the General Medical Council, whose minimal requirements have to be fulfilled by all teaching and examining bodies. Previously recommendations were very detailed, drawn up in terms of instruction, and added greatly to the difficulties of those who wished to educate rather than instruct. The new regulations are minimal and have been drawn up specifically to encourage Universities to experiment in educational methods.

Our Universities and Medical Schools are now presented with a great opportunity which it is the purpose of this conference to define and exploit. There are now sufficient teachers working under adequate conditions to allow medical education to constitute an education in the true sense of the word. The new regulations of the G.M.C. allow it. I would suggest that there should be one criterion by which the present curriculum and changes in it should be judged: will it improve the student's mind as an exact instrument? The imperative need is to set the student free so that he is not a mere temporary storehouse for information which he must reproduce and then quickly forget; and to see that at every stage he learns method and is required to write something for critical appraisal by his teacher. An inability to write English grammatically, or to use words correctly, is one of the surest signs of how a University course falls short of what should be a *sine qua non* of all University education, if University standards are to have any meaning.

To summarize, I would say that there have been few experiments in medical education in this country, partly because of the regulations of the G.M.C., partly because of paucity of teachers, and partly because of the inertia of the teachers themselves. The new regulations of the G.M.C. make experiment possible, but teachers still retain their inertia. Thus, an elderly anatomist, of the origin, insertion, and relations type, would tend to resist any attempt to integrate teaching of structure and function, with that of a young physiologist, because he had, as all of us do, become set in his ways, and probably largely because he did not even understand the language which his physiological colleague talked. Such experiments are only likely to be possible from time to time and in certain places. For example, the teaching of anatomy and physiology has been integrated at Birmingham for many years. As far as I know no successful attempt has been made to integrate medicine and surgery, though lectures have been combined. I know of one attempt to combine

medical clerking and surgical dressing, which failed as it was bound to fail because of incompatible personalities. Experiments with examinations are now proceeding, and I expect Professor Bull will say more. But I would like once again to emphasize that while we may and we must seek new methods of adjusting the curriculum and our teaching instruments to the increasing range and complexity of exact knowledge, the most urgent reform implies no new principle but one which is being increasingly lost in our Universities and schools. It is that whatever else we do, we should be absolutely sure that each of us, when he has finished, leaves the student with a finer mind than when he started. Perhaps the surest guide to this is the student's ability to express himself lucidly, accurately, and grammatically, his ability to marshal his evidence and draw his conclusions. At the present time I know of no University in this country with the single exception of Oxford, in the preclinical years, where this is done. To do it means individual attention, but nowadays we have enough teachers for that. What we have not yet got is a general appreciation in our faculties of medicine of the true aim of University education. To quote Sir Richard Livingstone, "It should be the pursuit of the first rate." To quote Karl Pearson, "the true aim of the teacher must be to impart an appreciation of method rather than a knowledge of facts." We are now paying the price for years of neglect of these elementary principles. In fact, it is not too much to say that the most important reform needed in this country now is to educate the teachers, both those of today so far as they are capable of being educated, and especially those of tomorrow.

I do not believe that the criticisms made of medical education are peculiar to this country. I am doubtful whether things are any better overseas. Nor is the criticism peculiar to Medicine. It is common to faculties of science in general. In the Manchester Guardian of September 15th is an account of a speech by Lord Geddes to the summer school in management studies run by St. Andrews University. He contended "that technical men rarely achieved the summit in industry, although there were exceptions. The pattern of scientific education in Britain had been one of specialization in technical studies to the exclusion of all other learning. On the whole, the scientific schools were producing the kind of mind to which production problems could be referred for detailed analysis and development, but the planning of an enterprise needed a mind trained to assess all the risks involved and so decide the policy. The universities should consider a radical change to give an undergraduate the opportunity to read a scientific subject for one or two years and then, as an alternative to a purely scientific degree, to drop further technical training in favour of arts subjects. There were dangers and problems in this idea, but he thought such a course would attract some of the best students who were not unduly concerned with the complete security conferred nowadays by a scientific degree, but were prepared to face the greater competition to an administrative career."

Now it seems to me nonsense to suppose that the subject matter of an arts course is inherently more suitable as a vehicle for sharpening the wits than is science, in which I include Medicine. But it is quite true that our science faculties, including medicine, by smothering the student with technological detail have lost sight of the true aim of education. This is to my mind the central issue that this conference must consider.

REFERENCE

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The Study of Students

N. MALLESON, M.D.
University College, London

I am conscious of having been asked here because I ride a hobbyhorse, and am to sell it to you. I am the more diffident about a piece of horse-dealing because, as our Chairman has told you, my work is concerned with University students as a whole, of which medical students form but a very small group; my little horse has been raised in wide barren wastes, not in the clover paddock of the medical school. You must forgive me, therefore, if I talk largely of matters which concern the generality of students, not only those of our own profession.

I call my hobbyhorse Operational Research. It has other names—Ecological Research, Student Performance, but I prefer Operational Research; it is the study of what goes on, of what happens to the student and, reciprocally, to his university environment as the two go through their course together. This is something different from the selection research with which many of you here will be every bit as familiar as I.

The truth is that some of us are becoming very doubtful of the value of selection research—or, at any rate, of selection research unaccompanied by Operational Research. As an illustration, I would quote the matter of standards in first-year examinations. It has been suggested that each faculty and department has its own unconsciously held norm of a proper casualty rate for the end of the first year, departure from which is regarded with discomfort. The difference between departments is maintained with remarkable constancy year by year, which suggests that the first-year exams reflect something else besides variation in student ability. One suspects that, if the failure rate is seen to be exceeding the traditional norm, the marking is loosened, and borderline cases are given the benefit of the doubt. Where too many seem to be getting through, the marking is stiffened. You will readily see that the only consequence of improved selection procedures in such a system is to improve the quality of the students you are going to chuck out. It is not the students but the departmental procedure for the first-year examinations that is here in need of investigation; that would be an example of Operations Research.

It is my view that quite a lot of selection research, though theoretically entirely sound, is open to practical objections of this kind. It is as if one were standing up a collection of ninepins, and bowling the ball down on them. The fallen pins can then be studied. After doing this many times, and with elegant statistical procedures, you will discover that there are two independent variables which determine survival chances; width of the base, and weight of the top relative to the bottom. The statistical significance of such a finding will be high. Its practical importance will probably be small; for it is the process of bowling that cries out for investigation. This is Operational Research.

Having praised my wares, I will now be modest about them—this is what the Americans call "the soft sell." Splendid as all this sounds, the truth is that our methodology, indeed the methodology of most sociological work of this kind, is so primitive and inaccurate that it is impossible to give firm answers to any of the things one would

like to know. One spends hours designing questionnaires and collecting volunteers. One spends weeks and months getting results and punching them on the Hollerith cards, and uses endless ingenuity in contriving how best to sort the variables against each other. Yet in the end this enormous mass of paper boils down to one or two very small answers, and more often to one or two very big questions. At the present stage, and in the forseeable future, there is no suggestion whatever that Operational Research procedures can replace the normal canons of common sense, human judgment, and teaching experience upon which any medical education is based. Operational Research must bear to teaching practice something of the same relationship as laboratory results bear to clinical practice. A leukocytosis and raised sedimentation rate are in no way a substitute for the clinician's diagnosis of infection. Operational Research can be an aid to deanery, not a substitute.

TABLE 1

University College, London 1953 Survey

SCHOOLING AND ACADEMIC ACHIEVEMENT (HOME STUDENTS)

	Graduated	Got 1st Hon.	Failed
Grammar	310	39 (12.5%)	41* (11.7%)
Independent	62	4 (4.8%)	22* (26.2%)
Other	38	1 (2.2%)	7 (15.5%)

* Significance: P = 0.01.

There is no time in a paper such as this to review the small but growing literature on this field, nor to discuss the sort of methods available and the pros and cons of their application. Instead I am just going to give you two examples of the sort of work that can be done. These I would like you to regard not as finished studies but as a sort of trailer, advertising next week's big picture. To get through them I shall have to be brief. Truth to tell, this is an advantage: with hardened statisticians like Dr. Morris in the audience, I embrace the well-known logistic principle that a fast-moving target is the more difficult to hit!

The first trailer advertises two retrospective questionnaire studies done at University College by Dr. John Hopkins and myself. The first covered four years of entry, 1948–1951, in which we sent questionnaires to all the students who had failed, and to a selected control sample who had graduated. The second was confined to the 1953 entry, but it was here comprehensive, and the material was drawn not only from postal questionnaires, to which 86 per cent of the ex-students replied, but also from everybody's college records.

Now it is well known in the Senior Common Room at our place, and probably at most other Colleges too, that the grants system is one of the troubles of the modern University. Of course, there is nowadays a high failure rate and a high breakdown rate. With the help of grants, children are coming up to University via grammar schools from home backgrounds where a University education and the academic approach are a complete novelty. Such children come from schools where they are big cocks on little middens, and are thrown into the competition of the University. Particularly they find themselves up against boys and girls from public schools, whose home backgrounds, sometimes for generations, have incorporated traditions of University and professional education. Table 1 is, therefore, of peculiar interest. It shows the academic performance of those who come from our "grammar schools" (here used to cover all state-supported schools) and the independent schools (here used to cover all fee-paying schools, in practice so-called public schools). It will be seen that, far from being the lame ducks, those from grammar schools have a failure rate of 11.2 per cent, but the privately educated, drawn primarily from the middle-class, have a failure rate 2½ times as great. They also get many fewer Honors degrees, but the numbers here are smaller and the statistical significance less.

Now this is a very remarkable figure indeed, and one that has amazed a great many of my academic colleagues. It is one

that is open to a great many explanations—which true, I do not know. I suspect the truth is a combination of several. The most obvious possibility, and I think an important one, is that the better public school boys more often apply to and are accepted at the classical Universities. Our figures alone cannot throw much light on this. In the questionnaire we asked which was the first choice of University, and we analyzed this against the failure rates. Table 2 gives these figures. It shows that the enormous majority of our students, in fact, have come to the University of their first choice. Our independent school entry does not appear to be a reject from Oxbridge, though this many reflect simply that the applicants have had realistic advice about whether they are likely to be accepted, and have not aspired too high. Of those whose first choice was University College, the same differential failure rate between schools is to be found. Of those whose first choice was elsewhere (Oxbridge in the enormous majority), there is the same differential, but some support for the idea that the very best may seek acceptance at the classical universities, for the failure rates are in both cases smaller (the numbers here are, however, too small for any great degree of confidence).

We have good evidence that this differential failure rate is not a spurious finding of the 1953 entry. For example, the earlier 1948–1951 study showed a similar pattern. Table 3 illustrates this, the "control group," here being a more or less matched group that graduated successfully.

Of the host of other possibilities that might explain the finding, I would illustrate just one. Table 4 suggests that failing students are more often uncertain about coming to college in the first instance. This, of course, is a retrospective finding, and must to some extent be an *ex post facto* justification for failure. However, we do have a

TABLE 2

University College, London 1953 Survey

SCHOOLING, ACADEMIC ACHIEVEMENT, CHOICE OF UNIVERSITY (HOME STUDENTS)

	First choice, London			First choice, elsewhere		
	Total	Failed	Failure rate (per cent)			Failure rate (per cent)
Grammar	212	21	10.0*	87	4	4.5
Independent	52	13	25.0*	16	3	19.0

* Significance: $P = 0.01$.

TABLE 3

University College, London Pilot survey 1948–51

SCHOOLING, FAILURE

	Independent schools	Grammar schools	Other
Failed group (N 176)	77 (43.7%)	84 (47.7%)	15 (8.6%)
Control group (N 212)	63 (30.2%)	140 (66.0%)	8 (3.8%)

TABLE 4

University College, London Pilot survey, 1948–51

CAREER CHOICE

	Confidence in decision on intended career		
	Little	Great or average	Not stated, etc.
Failed group (N 176)	32 (18.8%)	84 (47.5%)	60 (33.7%)
Control group (N 212)	22 (10.3%)	132 (62.2%)	58 (27.5%)

considerable body of ancillary evidence suggesting that uncertainty and ambivalence in application and career choice correlate with poor performance. Table 5 suggests that independent school children show this uncertainty more than their grammar school confreres.

Table 6 shows, as one would expect, that independent schooling and University education was more common in parents of children from the independent schools, and state schooling with no University education was more common in the parents of grammar school children. Table 7 suggests that the parents of independent school children are a little more often more keen that they should go to University. There is, in addition, a considerable body of ancillary evidence to bear out a supposition that the independent school boy, even though doubtful himself as to whether he should go to University, is nevertheless more often under pressure, sometimes overt, sometimes covert, from parents or teachers, and perhaps from his general social environment than is the grammar school boy, in whose circles going to University is not so normally prescribed.

I believe findings of this sort, no one conclusive by itself, paint a picture perhaps in keeping with one's common sense knowledge of present changes in English society. The middle and professional classes are under increasing competition and pressure, both financially and socially, and this pressure is felt by the undergraduate as he comes up. He has to keep a flag flying. Stresses and difficulties that he may meet in his course may, therefore, press him the more.

Such ideas are too sketchy at present to

TABLE 5

University College, London — Pilot Survey 1948–51

PARENTS' EDUCATION

	Father independent	Grammar	Not stated
Failed group (N 176)	59 (33.5%)	107 (60.8%)	10 (5.7%)
Control group (N 212)	29 (13.7%)	180 (84.9%)	3 (1.4%)
	Mother independent	**Grammar**	**Not stated**
Failed group (N 176)	62 (35.2%)	112 (63.6%)	2 (1.2%)
Control group (N 212)	39 (18.4%)	170 (80.2%)	3 (1.4%)
	Father University	**No University**	**Not stated**
Failed group (N 176)	38 (21.6%)	133 (75.6%)	5 (2.8%)
Control group (N 212)	17 (8.0%)	193 (91.0%)	2 (1.0%)
	Mother University	**No University**	**Not stated**
Failed group (N 176)	14 (8.0%)	160 (90.9%)	2 (1.1%)
Control group (N 212)	12 (5.7%)	197 (92.9%)	3 (1.4%

TABLE 6

University College, London — 1953 survey

STUDENTS' ATTITUDE ON APPLICATION (HOME STUDENTS)

	Keen	Against	Uncertain	Per cent uncertain or against
Grammar	244	5	50	18.3%*
Independent	46	3	20	33.3%*
Other	26	1	11	29.4%*

* Significance, P = 0.02.

TABLE 7

University College, London — 1953 survey

PARENTS' ATTITUDE TO UNIVERSITY (HOME STUDENTS)

	Against	Neutral	Keen
Grammar	8	111	177* (60%)
Independent	Nil	19	51* (73%)
Other	1	12	24 (65%

* Difference not significant beyond P = 0.02.

convey any infallible message to the University authorities; but even in their crude state they carry two implications. The first is to selectors, that they should be beware lest they are selecting a worse public school applicant before a better grammar school child because he has interviewed better. The second, and to me infinitely more important, is to say to those in charge of students who are selected, "Watch the privately educated most carefully. They are the ones under greatest pressure from society, and who may, therefore, need the most help."

My second trailer brings us nearer home. It is taken from an unpublished study we did on our 2d M.B. students coming up to the exam in March, 1957. I have chosen this because it well illustrates how this sort of work will give you more questions than answers. Most studies on examinations are inevitably retrospective, but on this occasion we were able to get the students to complete the questionnaires after they had sat their papers and some of their practicals, but before the final vivas and results were known. In this we had the very willing cooperation of the Medical sciences faculty and the most good-hearted help from the students who volunteered to a man. We drew up what I felt was a lovely questionnaire. It covered all the areas of motivation in which I was interested and asked questions about exam nerves, sociability, and personal history in the University. The entire lot was filled in, and in high expectation we coded and punched them and carried out blocks of cards down to the London School of Economics, and fed them into expensive machines. We sat at the other end as the results ticked out. The results were nothing—or almost nothing. There was the expected difference in schooling, as shown in Table 8; there was an interesting comment on pre-examination strain as shown in Table 9. You will see a substantial proportion of the cases felt that strain was actually impairing their working efficiency, particularly in the 2d M.B. term itself. One interesting little finding, completely in accord with one's clinical experience, was that strain particularly clustered into the upper and lower quartiles. It was the excellent student with high aspirations, hoping to read a B.Sc., and the poor student who knew he was likely to fail, that were the most troubled. The middle quartiles who knew they were safe for a pass—unless they got a stinker of an outside examiner—were not so worried. For all the rest the questions absolutely failed to reveal any significant difference between the good and the bad students, the failed and successful. As an example not uninteresting in itself, I would show Table 10 on vacation study. From this you will see that a very large proportion of students do earn money in the vacations but that the amount bears no relation to academic success. Actually, this in itself is quite an interesting little piece of Operational Research data, and we have many

TABLE 8

University College, London: 2d M.B. Survey, 1957

SCHOOLING

Description of school	Top 25%	Bottom 25%
"Grammar"	12	9
"Independent"	5	9
Direct grant	1	1
Overseas schools, etc.	2	1

TABLE 9

University College, London: 2d M.B. Survey, 1957

REPORTS OF PSYCHOLOGICAL STRAIN SUFFICIENT TO IMPAIR EFFICIENCY

	October term	Current term
Reported strain	18 (23%)	32 (41%)
No strain	57 (72%)	46 (58%)
No reply	4 (5%)	1 (1%)

DISTRIBUTION OF PSYCHOLOGICAL STRAIN, CURRENT TERM

	Reporting strain	Not reporting strain
In top and bottom quartiles	21	19
In middle quartiles	11	29

Significance: P = 0.05.

figures from other faculties which back it up. Vacation work does not seem to impede success. At about the time we were doing these studies the College authorities went on record with a rather severe statement of vacation work, saying that the students should not ideally undertake it save with the approval of the departmental tutor. This, you will not be surprised to hear, has been honored in the breach rather than the observance. Just as well, for the only data available showed that there is not only no negative correlation between vacation work and academic success; in certain faculties there is a strong positive correlation. The fact is, the good student is good at everything; he is good—and good at earning money.

TABLE 10

University College, London: 2d M.B. Survey, 1957

AMOUNT OF PAID EMPLOYMENT 1956 (N = 79)

	Summer vacation	Christmas vacation
None (or under a week)	36 (46%)	60 (76%)
One—3 weeks	15 (15%)	19 (24%)
Over 3 weeks	31 (39%)	0
Top quartile / Bottom quartile	No significant difference.	

But to my mind the most interesting part of the study was to be found in the answers to questions about private study. Both in the term before, the period immediately preceding the exams, and on the evenings of the exams themselves, we found no consistent difference whatsoever in the amount of private study reported. Tables 11 and 12 show this. Although the assessment of the time spent in study was retrospective, I am fairly confident of its accuracy in that it accords very closely with the findings of Doris Thoday at Birmingham. She used a much more sophisticated method of determining study periods. She interviewed large numbers of students of different faculties on different days of the week and had them detail what they had done the previous day. Table 11 shows the closeness of our agreement.

I found it surprising enough that there was no detectable difference in the hours of study: I found it more surprising that there was such an enormous range of difference between individual students. This is well shown in both the tables. Both the best and worst students were scattered indiscriminately over this range. It is indeed interesting to question why this should be. How is it that one young man, selected on much the same criteria as another, does 5 times as much study and yet gets considerably lower marks? One can hardly feel convinced that he is 5 times less intelligent; he passed the same exams before coming up. I suspect that the answer lies in the difference of study technique. The truth is that after primary school or prep school we never teach how to learn. Certainly at the University techniques of study are not taught. They are not taught because we do not know them. How many hours of reading represents the optimum, and what is the most efficient way of reading—con-

TABLE 11

University College, London: 2d M.B. Survey, 1957

HOURS OF PRIVATE STUDY REPORTED (PER WEEK)

	October term (N = 61)	Current term (N = 66)
Mean	19 (18)*	30 (1)
Range	3–60	10–60
S.D.	13	10·3
Thoday's survey: (Mean value for medical students)	19·5	28·0

* Failed students' averages in parentheses.

TABLE 12

University College London: 2d M.B. Survey, 1957

HOURS OF PRIVATE STUDY REPORTED

	Previous week (N = 74)	Immediately before the examinations: Sunday (N = 76)	Monday (N = 78)	Tuesday (N = 78)
Mean	54 (54)*	5 (5)	3 (3)	2 (2)
Range	12–90	0–18	0–9	0–6
S.D.	14·3	3·7	1·8	5·4

* Failed students' averages in parentheses.
Papers on Monday, Tuesday, and Wednesday.

tinued attempts at recall or to read straight through? Are detailed notes kept and recopied essential, or are they time-wasters? If there is variation between students, what determines it? Is the ectomorphic introvert different in his optimal study requirements from the mesomorphic extrovert? We do not know these things, and here is a ready-made field for Operational Research. For what hours of wasted study time might be saved and put to better use, academically or extracurricularly? If I have sold Operational Research to any of you, you could find no better place to start. But do not be too sanguine: answers are not easy to come by, even in a restricted field. If you want to take it up, come and have a glass of sherry with me first. You will waste less time in the end.

I hope I have stimulated some of you. If so, you will find this work fascinating. Of course you will draw many blanks; you will also find many delightful irrelevancies: that the students who sit in the front two rows at lectures get better degrees than those who sit at the back; those who take first Honours are more often married than those who take thirds. But amid the negatives you will, if you are lucky, draw out material of real value to medical education.

As a final commercial then, I am reminded of my little boy's chemistry set. On the box it says "Hours of fun—and instructive too."

Examinations*

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Examinations in the clinical subjects in the different medical schools in Britain are very similar. Our own can be taken as an example (Table 1).

The marks are allotted as shown in Table 1. More simply, we may divide the examination into two parts—written and interview. Let us consider the efficiency of the examination under these two headings. In each case there are two aspects to consider—the validity of the method (are we assessing the correct skills?) and the accuracy of marking.

TABLE 1

MARKS ALLOCATED FOR PARTS OF THE EXAMINATION

Part of examination	Marks (per cent)
Papers	50
Major case	20
Minor cases	15
Clinical pathology	5
Oral	10

Papers.—In the case of the papers, I have little to say on the validity. I believe we know very little about this, but in any event the accuracy of marking is so poor that the validity is at the moment of little importance.

When an examiner marks a single question written by a class of students, he produces an array of marks which have two sources of variance—variance due to students and variance due to the examiner, the examiner error. If he re-marks the same question on another occasion, or has it marked by another examiner, it is possible to partition the total variance into the components due to students and examiners. The examiner variance can be of three sorts:

1. One examiner may be more or less lenient than another. He marks to a higher or lower mean.

2. One examiner may spread his marks more widely than another. Instead of marking within a range of 45–65 per cent, he may mark from 35–75 per cent.

Both this and the first type of error are unimportant, because the students are ranked correctly, and in any event the marks may be adjusted to any desired mean and standard deviation. Marks so adjusted are called standard marks, and even when no standardization is carried out, the only effect is to give more weight to the wide range marker in the final result.

3. The third type of error is much more serious. It is random error and is incapable of adjustment. Any statistical assessment of marking must isolate this component of examiner error.

Dr. Cheeseman, our statistician, has shown that the correlation coefficient between two markings of a single question isolates the two components of student variance and the examiners' random variance, and I have used this technique to analyze the accuracy of marking of papers in our own examination and in examinations in other schools. The correlation coefficient, in fact, gives the same answer as an analysis of variance of the standard marks and so eliminates the two unimportant types of examiner error. Its significance can be seen in Chart 1.

* Based largely on previously published observations (1).

† Professor of Medicine.

These are scatter diagrams in which one might call one axis the marks of examiner A and the other the marks of examiner B. The correlation coefficient r measures the degree of agreement between the two sets of marks and may vary from $+1$, where the agreement is complete, to 0 where there is no agreement, and beyond to -1, where there is complete disagreement. Intermediate values of r are shown. The ellipses are calculated to contain 95 per cent of the observations.

a tight range. When we do a correlation coefficient, we in fact find a rather poor correlation of $+.42$. (Chart 2), which means that 42 per cent of the variance is due to students and 58 per cent is random examiners' error.

Chart 3 shows the same question marked and re-marked by another examiner. Here the student variance is even lower, 27.5 per cent, and the examiner variance higher at 72.5 per cent. In this case, in fact, the correlation was statistically insignificant. The marks might as well have been drawn from

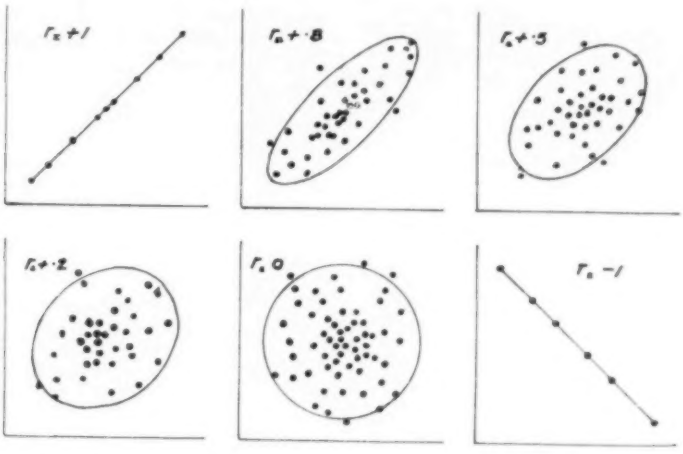

CHART 1.—Scatter diagrams to illustrate the use of the correlation coefficient

Table 2 and Charts 1 and 2 illustrate this in practice.

Table 2 shows two markings of a single question. Column A shows the first set of marks and column B the second. The differences between the marks are shown in Column C. At first sight, the agreement seems good. The percentage difference between the two marks is often 0 and mostly below 10. The mean marks are nearly the same (49.8 and 50.7), and the range of marks is almost identical. Most examiners at some time have remarked papers and been satisfied or even gratified to find results like this. They have not appreciated that the apparent agreement is largely the result of marking within a hat.

I have carried out this test on a large number of questions and frequently found correlations which were insignificant and sometimes as low as 0 and beyond. A point of some importance has emerged and that is that the length of the question affects the accuracy of marking, as is shown in Table 3.

As the questions become shorter, the accuracy of marking improves. Most papers contain four or five questions to be answered in 3 hours, and, as will be seen, the examiner error is unacceptably large. The efficiency of marking improves to a student variance of 66 per cent on the average in one-line answers, but even with such short answers

there is an appreciable examiners' marking error. Finally, multiple choice questionnaires have no marking error.

These results should cause no surprise. Similar studies have been carried out on the marking of papers in other subjects with similar results (2–6). In fact, an international commission which sat just before the last war produced a very damning report. Largely as a result of it the American examination system has gone over to a large extent to multiple-choice papers.

We may conclude that long questions are virtually useless for determining differences among students. This does not imply that they have no value. Students prepare for them by study so they provide some degree of educational stimulus. For this reason half of our written examination is in the form of essays and half is a multiple-choice questionnaire, but we place much more reliance on the latter for the following reasons:

Multiple-choice examinations carry no examiners' marking error. They sample a much wider spectrum of the student's knowledge, and by mixing easy and difficult questions make it possible to test both the borderline and the honors candidates. Comparison between groups of students from year to year, or from medical school to medical school, is possible, and, finally, one may test both factual knowledge and other skills such as the ability to make deductions from facts.

TABLE 2

RE-MARKING AN ESSAY-TYPE QUESTION

Markings		
1st	2d	Diff.
50	40	−10
45	40	− 5
55	55	0
50	50	0
55	60	+ 5
50	65	+15
55	55	0
45	55	+10
35	40	+ 5
50	40	−10
55	60	+ 5
45	65	+20
50	50	0
35	45	+10
60	50	−10
35	40	+ 5
45	45	0
45	45	0
35	55	+ 0
60	60	0
60	60	0
55	55	0
50	60	+10
60	50	−10
55	55	0
55	50	− 5
45	35	−10
55	55	0
50	40	−10
55	45	−10

Mean 1st mark, 49.8. Mean difference, 6.2.
Mean 2d mark, 50.7. Range marks, 35–65.

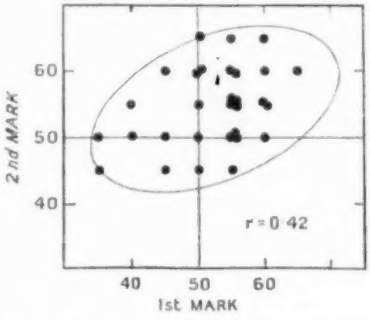

CHART 2.—Re marking a long essay question (1st examiner).

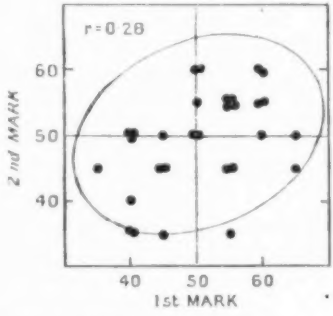

CHART 3.—Re marking a long essay question (2d examiner).

Multiple-choice papers have one serious disadvantage. They are extremely difficult to set and certainly do not save the examiner any time in comparison with the traditional papers. Another objection that has been raised is that the students will become even more illiterate than they are. I do not think this is a valid objection. If the ability to write is necessary then it should be tested separately by a properly designed examination.

Interview examination.—The interview examinations are rather more difficult to study because of the additional sources of variance introduced by different patients being examined and different questions being asked. However, even allowing for difficulties in interpretation of the statistical findings, I have found a surprisingly high degree of agreement among examiners.

TABLE 3

AVERAGES OF PER CENTS OF VARIANCE DUE TO STUDENTS AND EXAMINERS

	Students	Examiners
	(per cent)	
4 questions 3 hours	36	64
8 " "	43	57
16 " "	61	39
32 " "	66	33
Multiple choice questions	100	0

Table 4 shows the extent of agreement between two examiners when they interview candidates together but allot independent marks. In our examination the examiners are paired and a different pair takes each individual student for the different parts of "major case," "minor cases," and oral. As the table shows, they agree well within pairs, but, more than this, they agree well between pairs. On an average the between pairs correlation is $r = +0.625$.

Thus, it would seem that, faced by a student, examiners agree; but on what do they agree? This is much more difficult to decide. I have the impression, but here I am on less firm ground, that the main factors which influence examiners are connected with the personality of the candidate rather than his knowledge. I have three independent bits of evidence on this.

1. The correlation between the papers and the interview examinations is poor. In the case of essay papers this is not surprising, but it did surprise me to find that correlations between the multiple-choice papers and the various parts of the interview examinations were often insignificant. One may interpret this in different ways, but I find it difficult to believe that the multiple-choice paper, which is in itself consistent in that retesting with a different paper gives a similar ranking, is not testing factual knowledge. If this is so, we must conclude that factual knowledge plays a very small part in the marks allotted at interview.

2. With the help of my colleagues, Drs. Montgomery and Womersley, I designed a special examination which attempted to isolate the student's ability to elicit physical signs. The same patients were used throughout and the results assessed in writing and by independent interviewers. The percentage variance that could be attributed with certainty to the skill we were testing was only 16 per cent. It is, however, possible that this estimate was too low because of difficulties in interpreting the meaning of certain interactions in the analysis of variance.

TABLE 4

CORRELATIONS BETWEEN EXAMINERS AT INTERVIEW EXAMINATION

June, 1954

Between examiners of a pair	AB	CD
Major case	0·69	0·51
Minor cases	0·82	0·89
Oral	0·83	0·74

Average = 0·74

3. Somewhat more direct evidence on the importance of personality was obtained by the following means. Our emeritus Professor of Logic, who has no medical training, interviewed a group of students before the final medical examination. On the basis of a 10-minute talk on nonmedical topics he allotted marks to the students which correlated significantly to +0.45 with the final mark in medicine.

Although these three bits of evidence are less satisfactory than in the case of the papers, they do point to the possible importance of personality in determining the marks in interview examinations. They certainly demonstrate that we do not know what we are testing in these circumstances. Properly designed studies carried out in cooperation with psychologists would be of interest, but in our present state of ignorance should not influence us in deciding a student's fate. Whatever the outcome of such studies, I do not feel that we are doing a great injustice to our students by continuing interview examinations. Probably in the last analysis a doctor's personality is as important as his knowledge.

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Social Medicine

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Social Medicine is the branch of medical studies concerned with the health of the community, the relations of health to the mode of life, social provisions for health—and with the impact of all these on the individual and family.

Changing character of health problems.—We have not yet achieved the affluent society, but with the rise in the standard of living, full employment and the development of social services, the failure to satisfy elementary physiological needs is no longer a major source of ill-health in our country. There still is disgraceful poverty, and we could certainly do with a Boyd Orr of housing and the slums. The old problems are by no means altogether solved; but even they seem to have changed in character. Thus, coal miners now have about the highest wages of the "working class"—and about the highest infant mortality, which is quite unexpected in terms of classical social medicine. Of course, it is chiefly in current income that the miners have been doing so well and not yet in capital goods, whether of education or housing or urban amenity. Still, there is probably more to it than that, and the many hundreds of doctors who, each year, deal with grave illness in miners' children—are they equipped to see what is going on in miners' families? We know little about this. Sociologists tell us that in contrast to the modern merging of parental roles miners are the last stronghold of traditional divisions.

However, infant mortality is by no means typical of medicine today. Mental illness and injuries present major problems. The metabolic, malignant, and so-called "degenerative" diseases increasingly dominate the picture: conditions affecting all sections of the population—social medicine is no longer synonymous with slumming—and usually incurable. How to live with them, how to maintain working capacity and reduce disability, and how to prevent breakdown is often the main problem. They require continuous care, anticipatory as well as remedial; involving multiple agencies; and mostly they must be treated out of hospital. These diseases may have profound repercussions on the patient's family, its economics, customary roles, long-established stability. Such problems are reshaping the structure of health services and governing how they are to be paid for. This is one way of introducing the student to social medicine (5).

Epidemiology is the main method of social-medical study, and it has suddenly become fashionable. Everybody wants epidemiology. In the U.S.A. recently I saw the protocols of two dozen population studies in cardiovascular disease, most of them set up by clinicians. The reasons for this flowering are simple: epidemiology is the main way of investigating systematically the connections between disease and the mode of life, and there are multiplying suggestions that today's plagues are importantly bound up with our mode of life—with rising material standards, cigarette smoking, luxury diet, physical inactivity, the isolation in cities. It is not difficult to interest the student. He needs to be shown epidemiology as a method of learning in medicine, and its relations to the other methods of clinical observation and laboratory experiment. The question who should do the teaching must

be answered in the same way as in the rest of the medical school: teachers who are themselves also trying to advance their subject. However, the practical difficulties have proved formidable in both the U.K. and the U.S.A.

Quantitative methods.—The social medicine department must expect to teach statistics and will be wise to welcome the opportunity. Statistics is an essential part of the scientific method as applied to medicine—what are facts; probabilities; what opinions, impressions; what hypotheses? With current developments the doctor must be able to handle quantitative data in his practice and in discussion with his patients. Statistics are a necessary means of the community's and the doctor's self-appraisal. There has been a remarkable change in the attitude to statistics among doctors, if not among students.

Social services.—While I am talking about the scientific outlook let me say that it is a kindness, to put it no higher, to help students toward some understanding of the origin and development of social services, including the National Health Service in which the majority will spend their lives. This will not include the details of administration; but it will introduce them to the problems of how a democratic society with limited resources, and believing in mutual aid and joint responsibility for meeting basic human needs—how such a society can provide medical care for an aging population, with medical needs changing as they are and in face of the explosive advance of medical science (6).

Social aspects of clinical medicine.—I am sure that the teaching of these must lie mainly with the clinicians themselves. The idea is that patients are not to be understood as individuals only; but each belongs to family, work, local, and other groups the membership of which affects his behavior and his healthy functioning: these groups in turn are affected by him. The physician, as he brings out "the environmental aspects in the case," is already teaching this. In tuberculosis he compares patients now with the very different days when he was a student; he considers economic causes and consequences; domestic and urban crowding; occupational repercussions on the patient and his mates. The physician already elucidates psychological precipitation of phthisis by a stressful life situation; traces secondary cases in the family and brings to light familial guilt over a tuberculous child. He analyzes the social as well as the personal components of disability. Perhaps it would help if particular situations were more often related to common processes in our society.

Here are a few examples where the social sciences might enlarge clinical understanding and perhaps the doctor's capacity to help. The man who retires and presents clinically with breakdown often has lost not only his status in our society and much of his income, but may find that the three-generation grandmother/daughter/grandchildren pattern in which the family is organized has no place for him. . . . Social attitudes can affect the physician's outlook even in diagnosis, as the differences found in the labels he now gives to the same mental disorders among patients of different social classes demonstrate. . . . It is clear that "delinquency" may be normal in some districts, and obviously the interpretation of delinquent behavior must be affected by knowledge of where patients live. And not only delinquency. . . . The surgeon with a sense of social responsibility once again taking a history of how a heavy object fell on the workman's foot, and reading the "riot act" to the patient and his employer, may be on quite the wrong wave-length if the culture of the factory is *not* to observe safety precautions; indeed, there may be systematic collusion between management and men to ignore them. . . . In the old days, when life was simpler, the good general practitioner knew a lot of this and was doubtless the better for not being able to give it names. With the increasing complexity of our society and its rapid changes, however, the social life of his patients is no longer to be understood by simple observation and common sense, and we should help the doc-

tor of the future to look and to see (1–3, 7).

Now for two more controversial topics in what is largely a spectator's view.

Social studies in the preclinical period.—The preclinical years are among the finest achievements of British medicine, but aren't they strangely unscientific—all anatomy, physiology, and natural science? There is little recognition that the family is the natural order of human life; living in groups is normal; height, weight, and hemoglobin levels are also economically determined; what is stressful depends on the culture as well as the personality. Yet even a little demography can describe modern changes in family size from four children to two, in life expectancy from 40 odd to almost 70, the addition of 100,000 old people a year to the population, the earlier age of marriage. These population movements set up new relationships between the generations, create—and abolish—common stresses, shape social policy, dictate the work of medicine. Smoking rates are interestingly different in ex-public school boys, ex-grammar school and ex-secondary modern; in teddy-boys and medical students. The differing habits of social groups are becoming crucial in preventive medicine. Their differing outlook, of middle-class doctors and working-class patients, for example, means that communication in medical care should on no account be taken for granted. And so on.

It is an awful responsibility to suggest additions to the medical curriculum, but if social medicine is to be taught seriously in the clinical years—and practiced thereafter—the foundation must be laid before. This is a plea for the enlargement of science in medicine but also unashamedly for the liberal education of the doctor, to give him the framework for his own observation and self-education, to fire his interest. The introduction of such material into the preclinical course would make good matter for experiment. Whether it is possible to be serious and solid in the few hours likely to be available will have to be seen (4).

Medicine outside the hospital.—The most difficult aspect of medical care at present, and one about which there is much dissatisfaction, is that of the continuing care, physical, mental and social, of patients with the common chronic ailments. By far the greater responsibility for it lies with families and family doctors; and this is likely to increase with the movements toward domiciliary care. An instrument needs to be created for learning about these problems among families and with the family doctor in the traditions of British clinical medicine of example and experience. (It is not possible to teach on a reality basis inside a hospital how to keep people out of it.) The need is more general. The optimum collaboration of the three branches of the National Health Service, and related services, in support of the individual and family, needs practicing and experiment—with the doctors and social workers involved. The hospital is too circumscribed a place to demonstrate the possibilities of prevention in clinical work, for example, through the opportunities offered by the common clusterings of disease.

This question, however, goes further. There is increasing emphasis on the early detection of disease before irreversible changes have occurred, whether it be diabetes, severe hypertension, or depression in the elderly. Moreover, it begins to look as though a good deal of ordinary and approved individual behavior will have to change if much of today's disease is to be prevented from occurring at all. To explore what these involve in practice means again going outside the Teaching Hospital, making contact with the ordinary population in their day-to-day affairs, meeting families who are not "ill." The Teaching Hospital, that is to say, is no longer by itself an adequate instrument for the Education of doctors. It needs to be supplemented, and not only for the proper teaching of the social aspects of medicine. This is an area of urgent need for experimentation, with functional arrangements that will suit the hospitals and doctors concerned and don't involve large budgets and expensive buildings.

Whether all this means that the Teaching Hospital-Medical School must itself enter

general practice is arguable. This certainly has the additional advantage of showing how the standards of medicine that obtain in the hospital can be translated to the very different situation outside it, thereby setting standards for general practice as a whole.

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The Approaches of the Faculty to Medical Education at Western Reserve University

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It is a privilege to participate with the Association for the Study of Medical Education in this first meeting, which is concerned with the broad subject of experiment in medical education. The objectives of the programs of education, many of the methods, and the needs of the medical student and the medical graduate can be discussed and compared with much merit by the schools of medicine of our several countries. Many would agree that the broad objective of a school of medicine is to help the individual student develop his own abilities for a life in the profession of medicine, whether he becomes a general physician, specialist, teacher, investigator, or participant in other activities in medicine.

The medical curriculum in any school is a resultant of many steps in the reasoning of its faculty and is unique to the particular school and its community. In all schools the courses will require continued alteration to meet the changing requirements of medicine and the advances in knowledge in the biologic, clinical, and social sciences. A variety of methods may be employed to accomplish a stated objective.

In this report from the School of Medicine of Western Reserve University, emphasis will be given to the methods employed by the faculty in governing itself and in the approaches to the development and to the conduct of the program of medical education. It is recognized that controlled experiments have not been conducted as yet and must await the development of reliable methods for the measurement of the effects of different aspects of the program.

Review of the program of medical education at Western Reserve University was initiated by Deans Joseph T. Wearn and John L. Caughey, Jr., after World War II. It was agreed by the faculty and by the directors of departments, many of them newly appointed, that they would study the program of medical education for all 4 years and would consider changes. At this time it was found that the curriculum had grown steadily by accretion and was extremely crowded and specialized. The student often was instructed in a course that was characterized by rigidity and a lock-step schedule which gave him little freedom. Frequently the student was treated as a school boy and given as many as 32 examinations in one year. Departmental barriers were found to be firm, with little or no intercommunication and little hope for change. With this background, the faculty began its study of the whole program and related it to programs of education in other professional schools and in other schools of medicine in the United States and abroad. This development has been greatly helped by generous grants, beginning in 1950 from the Commonwealth Fund of New York City.

General Faculty and Committee on Medical Education.—Before any change in program was contemplated, the first step taken was the consideration of the method by which the faculty would govern itself in relation to the program of medical education. The Gen-

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eral Faculty was founded in 1946 under the leadership of Dean Joseph T. Wearn. To it was delegated, by the legal faculty of full professors, the responsibility for student affairs, instruction, and interdepartmental cooperation. Currently the General Faculty has a membership of approximately 300 persons who have a rank of assistant professor or higher. Each director of the twelve departments appoints two additional members to the General Faculty who have a rank less than that of assistant professor. The departments include anatomy, biochemistry, medicine, microbiology, obstetrics and gynecology, pathology, pediatrics, pharmacology, physiology, preventive medicine, psychiatry,[1] radiology, and surgery (Chart 1).

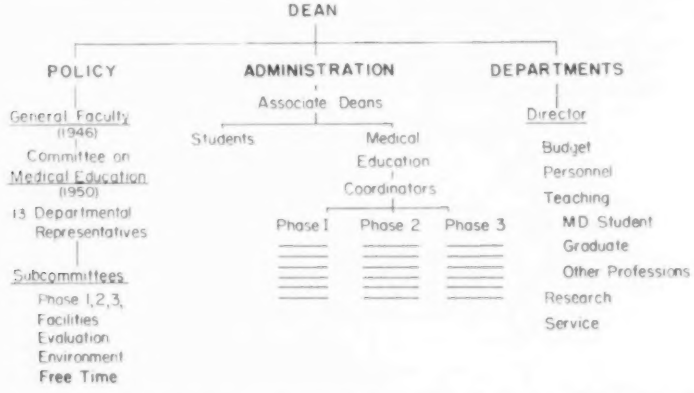

CHART 1. Approaches of the faculty of the School of Medicine. Policy for student affairs, instructional matters, and interdepartmental cooperation is the responsibility of the General Faculty. The Committee on Medical Education advises the General Faculty on the whole program of education. The administration is responsible for conducting the program as related to students and to the organization of subject committees. The departments are responsible for all personnel, research, and for the content of the teaching program of their respective fields.

In 1950 it was agreed that the program of medical education would be evolved by a standing Committee on Medical Education of the General Faculty which would have the following continuing responsibilities: (*a*) selecting and defining objectives of medical education, (*b*) evaluating current programs, and (*c*) developing and recommending changes in programs of medical education. The membership would be composed of one representative from each department, appointed by the director of that department for a term of 4 years. The Chairman would serve for a term of no longer than 6 years. A Council of the Committee on Medical Education would be formed and would consist of the chairman of the Committee, two members appointed annually by the chairman, and two members elected annually from the Committee. The Council would advise the chairman on agenda, appointment of subcommittees, and the total responsibilities of the Committee. Subcommittees of experts would be asked to make special studies. Students would be invited to participate. The following is quoted from the original agreement.[2]

ARTICLE XIII. *Program of Medical Education.*

Section 1. *Approval and Conduct of a Program.* It is believed that the program of medical education can be evolved in a continuing and experimental manner with freedom of discussion, with opportunity to disagree and with opportunity for departments, faculty and students to cooperate.

[1] A division of the department of medicine.

[2] Organization and Rules of Procedure for the Committee on Medical Education of the General Faculty, October 31, 1950.

It is understood that the Committee will make detailed recommendations concerning the program of medical education for approval by the General Faculty. It is understood that the Committee will have no direct administrative authority to change or enforce a program of medical education. When approved by the General Faculty, the program will be conducted by members of the Departments and not by the Committee, which would continue, however, to evaluate the program.

Section 2. *Details of a Program.* When a program is reported to the General Faculty, it is understood that certain features will be considered and reported on in detail, such as the following: (1) object of the program, (2) methods for conduct of the program, including the delegation of authority when more than one department is involved, (3) detailed description of the program with a schedule of hours required for the conduct of the program, (4) if experimental trial on a small scale is necessary, a report of such a trial will be included, (5) methods of teaching, (6) method for evaluation of the program, (7) estimated time and cost of the program.

It was further agreed that the program of medical education would be devised so as to be compatible with the research, postgraduate teaching, and clinical responsibilities of the faculty. It was recognized that the program of medical education would require the development of an administrative organization to fit the changing needs of the plan.

Outline of an investigative approach.—Through the Committee on Medical Education it has been possible for the General Faculty to approach the whole program of medical education and its several parts by employing the following series of investigative steps.

1. Attempting to define the changing objectives of the profession of medicine and its members.

2. Attempting to define the objectives of a school of medicine as related to needs of the medical profession.

3. Continuing to review the current program in relation to the objectives with the deriving of working hypotheses, premises, and detailed objectives.

4. Selecting of faculty for the program.

5. Selecting of students and the methods of treating the medical student as a member of a graduate professional school.

6. Selecting of subject material for the program of medical education, first broadly and then in detail, as related to biologic, clinical, and sociologic fields.

7. Choosing of educational methods such as lectures, laboratory work, demonstration, conference, tutorial and preceptoral exercises, student projects, participation in patient care, examinations, syllabus material, textbooks, and teaching aids.

8. Planning of the curriculum for faculty and students including interdepartmental cooperation, time, equipment, space, laboratory and clinical facilities, and community requirements for students and faculty.

9. Describing by the faculty and administration of the actual program as it occurs, including the participation of faculty, of students, costs, and other aspects of the curriculum.

10. Recording of the response of faculty and students, including subjective opinions, objective examinations, observations of performance, testing of attitudes of faculty and students. Although quantitative measurements are limited by the methods available it is believed that methods for evaluation of student performance, for example, can be devised as the objectives of the several parts of the program are defined clearly and in detail by the faculty.

11. Attempting to define the significance and limitations of the results. Obviously, many of the results will be limited to crude approximations or opinions and will be expressed in descriptive language. Other results of the educational program may be measured with increased reproducibility. In some instances the measurement of student performance may have value in selection of students and, then, in predicting future performance by the graduate in his professional career. Constructive and destructive criticism of the program can be evolved from a study of the results.

12. Revising the program of medical education based on the study of current results and the re-evaluation of the objectives described above in steps 1 and 2.

Development of objectives and programs.—After establishing the methods by which the General Faculty would govern itself and approach the program of medical education, it

was necessary to define the objectives. These objectives were derived as outlined below, were written down, were agreed upon in principle by the General Faculty, and have served since 1951 as the basic premises for the development, by many members of the faculty, of the detailed plans of the current curriculum. Each director of a department and administrative officer was called upon informally and asked for his opinions and recommendations. Then, each department was asked to report in writing, through its representative on the Committee on Medical Education, answers to the following questions: (*a*) objectives of the teaching program of the department, (*b*) outline and criticism of the current program of the department; (*c*) plans and hopes for the future; (*d*) subjects in which there is overlap with other departments; (*e*) phases of subjects which can best be taught in cooperation with other departments; and (*f*) relation of the objectives of the department to the objectives of medical education.

Reports on objectives were obtained from members of the faculty who had made special studies over a period of several years. Because of the large influence on the faculty in the development of policy, the reports are listed in part as follows:

A. D. Welch, Committee on Correlation of Instruction, April, 1948.

R. F. Parker, Committee on Curriculum and Instruction, on over-all objectives of undergraduate medical education, January, 1949.

V. Lorber and D. F. Opdyke, "Preliminary Notes for an Outline of the Introductory Phases of a Unified Medical Curriculum," May, 1949.

J. L. Caughey, Jr., reports to a conference on medical education in Great Barrington, Massachusetts, in September, 1949, including a design for a unified laboratory and a program for the introduction of first year students to clinical and social aspects of medicine.

Dean Joseph T. Wearn, report to the General Faculty on the curriculum experiment in medical education, supported by a grant from the Commonwealth Fund, February, 1950.

A. E. Feller, "Report on Correlation Clinics," November 24, 1950.

The written reports of each department and those of other persons were presented by the representative and discussed in detail in a series of weekly meetings held over a period of a year with the Council of the Committee on Medical Education. These meetings of six people were informal. The discussion was recorded and summarized. All the reports and the corresponding discussions were published in a limited edition of 80 copies of a report of 197 pages to the General Faculty in February, 1951. These copies were circulated widely and discussed in detail.

Members of the Committee on Medical Education read widely of curriculum studies elsewhere (2, 3, 5, 8, 10–12, 18, 23–25) and consulted colleagues at Boston University (2), the University of Colorado, Harvard University (3, 5), the University of Pennsylvania (18), Tufts, and other schools. The collected information and opinions were studied, summarized, and revised eleven times by the Committee on Medical Education and submitted on April 10, 1951, to the General Faculty as "Objectives concerning the Curriculum." This report, of four pages in length, was limited to the broad aspects of the proposed program and has served subsequently as the basis for the third step, which was the detailed planning of the program by experts on the faculty.

The following persons took positions of leadership in the planning of programs based on the original objectives but done as a cooperative endeavor of representatives of the twelve departments of the School of Medicine. The actual program is outlined for each of four years of medical education in Tables 1–4 (see Appendix).

Subcommittees on Curriculum:

Phase 1, Dr. H. G. Wood, Professor and Director of the Department of Biochemistry

Phase 2, Dr. A. R. Moritz, Professor and Director of the Department of Pathology

Phase 3, Dr. F. A. Simeone, Professor of

Surgery and Director of Surgery at the Cleveland Metropolitan General Hospital

Subcommittees on:

Facilities for Students, Dr. L. O. Krampitz, Professor and Director of the Department of Microbiology

Free Time, Dr. H. S. Ginsberg, Associate Professor of Preventive Medicine

Educational Environment, Dr. N. L. Hoerr, Professor and Director of the Department of Anatomy

Evaluation, Dr. J. H. Dingle, Professor and Director of the Department of Preventive Medicine. Professor Robert K. Merton and staff of the Bureau of Applied Social Research, Columbia University, New York City, have made observations on students during the years 1953 to 1958, inclusive.

Multiple committees then planned intensively until Phase 1 of the program was initiated in September of 1952, Phase 2 in September of 1953, and Phase 3 in February of 1955. More than 300 members of the faculty participated directly in the development of detailed plans. Dr. John W. Patterson served as the first coordinator and assistant dean of medical education to provide administrative leadership to the conduct of the program.

The first class under the revised program graduated in 1956. This was 6 years after the initiation of intensive planning and 10 years after the inception of the plan by Dean Joseph T. Wearn and the founding of the General Faculty. Currently the faculty is teaching Phase 1 for the seventh time and Phase 2 for the sixth time. Dr. F. C. Robbins is chairman of the Committee on Medical Education which is continuing to review the objectives and results of the program.

Each June since 1952 the representatives of the Committee on Medical Education and faculty members responsible for teaching have met for 2 days in the country at Gates Mills, Ohio, to discuss the results of the preceding year and the proposals for changing the future program. Approximately 80–90 persons have participated in the formal and informal parts of this intraschool program each year. This is a unique experience, because the leading faculty members of all departments meet together for a 2-day conference related to their interests in medical education. Recently there has been added to these meetings a discussion of the biologic and clinical research programs of several departments.

Educational environment of the student.—Only a few examples of the actual program (1, 4, 6, 7, 9, 13–17, 21, 22, 26–28) will be considered here. One of the major emphases of the objectives has concerned the student. In the United States the medical student at the time he is admitted usually has had 4 years of college, is 21–22 years of age, and has had physics, inorganic and organic chemistry, and biology. His selection by the medical school is based on his performance in college, his personal attributes, and the results of a nationally administered series of medical college admission tests. When the student enters the medical school he expects to work hard. Only about 5 per cent of all students fail to graduate, and only a few repeat their examinations.

The faculty of the School of Medicine attempted to design an educational environment in which the student would be treated as a member of a graduate school. It was believed that consideration of the student's development could enhance the effectiveness of the educational program for the individual student. The following is quoted from the "Objectives Concerning Curriculum," April 10, 1951.

> It is essential that the MD-student be treated as a maturing individual, as a colleague, and as a student in a graduate professional school who is given increasing responsibility for his own education, for a knowledge of medicine, and for the care of patients. This requires a mature system for examination and grading of the student and encouragement of the student's initiative and resourcefulness. For example, in each year the MD-student should be given time for elective studies or courses and for conduct of unassigned work on the initiative of the student in such activities as organization and digestion of information, reading and interpretation of literature, prepara-

tion of reports, study of problems or cases, and conduct of research.

There should be longer contact between the student and his instructors to provide the educational and personal guidance of a graduate school and the advantages of preceptorship.

From these objectives the Faculty developed a series of programs and policies outlined in Tables 1–4. For example, each student is granted free time in Phase 1 and 2 of three half-days each week, on week-days, to permit him to proceed with his own education. In Phase 3 he has 4 months for elective studies. A project program has been evolved in which each student is required to do a study in depth with a faculty member in the first and second years and to write a thesis concerning the project in the fourth year.

The students take four or five interim examinations each year and a comprehensive examination or a National Board examination each year. All of these examinations are written and are scheduled as shown in Tables 1–4. Students have not been graded or ranked but have been evaluated broadly on written examinations, laboratory activities, clinical ability, care of patients, and their project program. Students usually have contact of 2 years with their project director, and they work with a clinical preceptor every week for 4 years, although the preceptor changes each year. These programs have brought continuity of guidance for the student in scientific endeavor and in clinical learning. These prolonged contacts have formed a tutorial relationship for the student and have brought him friendly advisers as well.

The multidiscipline laboratory (21, 26) was devised so that each student would have a home base for a year at a time where he could study and do laboratory work requiring the performance of biologic techniques except dissection of the adult cadaver. This facility is always open to the student and has continuing use.

Correlated teaching.—When the faculty considered the actual program of education, it decided that the biological sciences in the first year would be taught in the same manner to 80 medical students and to twelve to sixteen candidates for the Ph.D. degree or the combined M.D.-Ph.D. degree. This has now been done for 6 years. Also, the faculty decided to teach the biologic and medical subjects in a correlated manner. This immediately implied that a subject might be taught from several points of view, requiring the cooperative planning and teaching of members of more than one department. It was also recognized that coverage of subjects had become impossible so that it was essential to emphasize the student's understanding of basic principles, his methods of study, and his evaluation of information. In retrospect, these major commitments for correlated teaching of subjects appear to have resulted from several premises in the thinking of the faculty, such as the following.

1. Teaching in a correlated manner could parallel closely the faculty's research in which more than one biological method was used.

2. Teaching in a coordinated manner allowed the application of many approaches to understanding a subject and could avoid extreme specialization.

3. Subjects could be chosen in biologic and clinical fields that corresponded to the current manner of the grouping of facts and principles, such as cell biology (15), the cardiovascular pulmonary systems (22), the endocrine system.

4. A sequence of subjects could be arranged that would afford the student a reasonable and logical development of his understanding of biologic, clinical, and social sciences.

5. The time and subject matter, previously taught by departments alone, could be regrouped into subjects in a logical and equitable manner without penalizing departments.

6. Repetition and coverage of a field could be controlled to give depth of study without wasteful and unknown repetition by many separate departments. It is recognized that repetition is essential and, therefore, would be carefully planned.

7. Interdepartmental communication and teaching could have advantages for the faculty as well as for the students.

8. The content and methods of teaching of subjects would be subject to continuing review, research, and change.

Schedules of the program.—The current schedule for Phase 1 is shown in Table 1. The objective is to learn the normal biologic structure and function of man by the study of a series of subjects as outlined and to observe the normal growth and development of an infant as a member of a family (16). Each of the biologic subjects is taught as a cooperative endeavor of representatives of several departments. For example, the subject committee on cell biology (7, 21, 28) is under the leadership of the department of biochemistry with cooperation from the departments of microbiology, anatomy (histology), physiology (cell physiology), and medicine (research in cell metabolism). Each subject committee plans its own program; discusses it with the executive committee of the appropriate phase; plans lectures, demonstrations, laboratory exercises, syllabus material, conferences, student exercises, examinations; and then conducts the program with assistance from other faculty members, postdoctoral, graduate, and medical students.

In Phase 2 the mechanisms of disease, pathologic physiology, and the development of abnormal symptoms and signs are presented by subject committees, as shown in Tables 2 and 3, in a sequence similar to that of Phase 1 (21, 22).

In Phase 3 the basic clerkship is given for the 4 months of February through May, so that students may qualify to proceed with the rest of their program of the senior year. This is an introductory clerkship in which the emphasis is placed on the clinical method. Throughout Phase 3 each student has one afternoon in the Continuity Clinic, where he follows selected patients under the guidance of a preceptor. He follows his original family, including the parents, and observes selected patients in the prenatal clinic whom he will deliver when he is on obstetrics.

Each student also participates at two different periods in Phase 3 in seminars on biologic and clinical subjects as indicated in Table 4. In these exercises, lasting 12 or 16 weeks each, approximately ten students meet for 2 or 3 hours per week with one or more members of the faculty and study in depth the biologic basis of a clinical subject.

Administration.—Administratively, the chairman of each subject committee is responsible to direct the program, to coordinate it with others, to approve the personnel of the subject committee, and guide the whole activity (6, 13, 21). The several chairmen of subject committees in each of the phases shown in Tables 1–4 meet at intervals to discuss their programs with the coordinator for the individual phase. Dr. M. F. Utter, Professor of Biochemistry, is Coordinator of Phase 1; Dr. H. S. Ginsberg, Associate Professor of Preventive Medicine, is Coordinator of Phase 2; Dr. R. F. Williams, Assistant Professor of Medicine, Director of the Out-Patient Department of University Hospitals and Assistant Dean, is Coordinator of Phase 3.

The directors of departments continue to review teaching material and programs by serving on executive committees for each phase. Accordingly, Phase 1, Phase 2, and Phase 3 each have an organization for evolution of its program and personnel for teaching. Thus, the faculty and administrative officers manage these large units of teaching as a series of interrelated subjects which constitute periods of 34 weeks for Phase 1, 54 weeks for Phase 2, and 16 months (64 weeks) for Phase 3. By this method, the program becomes an interdepartmental responsibility, with a significant degree of unity provided by the faculty for each of the phases.

The administrative officers of the School of Medicine include Dr. Joseph T. Wearn, Dean, and Dr. John L. Caughey, Jr., Associate Dean for students. The administration of the program of medical education as related to appointment of chairmen of subject committees, development of syllabus material, management of laboratories, direction of clinical facilities, and coordination of all the activities of subject committees comes under the immediate direction of two assistant deans, Dr. S. J. Cooperstein, Associate Professor of Anatomy, and Dr. R. F. Wil-

liams. This administrative organization and these procedures have been developed because of the need to coordinate a program that is based on teaching by subject committees whose members come from several departments. Each year the Committee on Medical Education and the General Faculty review the policies and personnel of the total program but have no administrative authority in the conduct of the program.

DISCUSSION

A limited progress report can be made at the present time from the experiences of the past 12 years of development and conduct of the program of medical education at Western Reserve University. Also, certain questions can be asked concerning the future.

The approaches of the faculty have been emphasized here as related to the development, conduct, and continuing evolution of a program of medical education. Much attention and effort have been given to these methods because they are the procedures by which the faculty governs itself and develops and evaluates the teaching program. It is obvious that the curriculum can never be fixed or final and will always require change. Therefore, it is considered essential for the faculty to devise and employ methods for curricular revision that are orderly, that are continuing, and that are based on research observations and on democratic principles of participation by the many responsible faculty members.

As described in this report, the teaching of candidates for the M.D., Ph.D., and M.D.-Ph.D. degrees is done as a cooperative and interdepartmental venture. This is accomplished by a planned balance of three responsible groups in the School of Medicine, namely, the General Faculty, the administration, and the departments, as indicated in Chart 1. This organization (13) is comparable in structure and balance of powers to that of (*a*) a federal legislative body (General Faculty and committees), (*b*) a federal administration (deans, coordinators of phases, and subject committees), and (*c*) separate states (departments). This balance is arranged purposely to allow for communication, discussion, and excellence of performance of participating groups whose members are chosen because of expert ability.

The General Faculty, through the Committee on Medical Education, has true representation of the departments and is responsible for policy through legislation and review of objectives, personnel, and the results of the program. The administration, through the deans, coordinators, and subject committee chairmen, conducts the program and makes plans for the future within the broad policies approved by the General Faculty. The departments, through their directors, control the personnel who teach in the program, and they also approve and suggest changes in teaching through the executive committees for each of the three phases. The departments are strong individual units which are responsible for their own budgets, for all faculty personnel, for research, for postdoctoral training programs, and for service to patients.

Many formal and informal activities of this organization have functioned for 8 years of planning and 6 years of actual operation. These several approaches within the organization have brought the following: (*a*) broad communication with the faculty, (*b*) continuing debate, (*c*) an opportunity for faculty members to know each other well, (*d*) participation by many members in the development of policy, (*e*) important contributions by young persons, (*f*) final judgment by peers who are experts in their fields, and (*g*) a decrease in the feeling of bigness in the School of Medicine and a decrease in isolation of departments or separate hospitals. These activities appear to have resulted for the faculty in cooperative endeavor, enthusiasm, critical appraisal of results as in other kinds of investigation, and continued evolution of the program. Undoubtedly enthusiasm will be maintained only if young men of ability are given responsibility for development and conduct of future changes of the program.

Preliminary results and impressions of

the program itself are as follows. The students appear to enjoy their course in medical school. They have performed adequately in the comprehensive examinations given by the School of Medicine, at the end of Phases 1 and 2, and in the National Board examinations given twice in Phase 3. As judged by performance, there is good relation between the student and preceptor, the student and patient, and the student and project director. At least half of all students have elected to continue their projects during one summer vacation period of 2 months. Undoubtedly the project and free time are influencing the educational environment of the student by treating him as a member of a graduate professional school. The student is held responsible to study and think for himself. The students from the classes of 1956, 1957, and 1958 have competed well for positions as interns through the United States.

Currently there is enthusiasm in the faculty to continue the correlated teaching by interdepartmental subject committees. The sequence of subjects, shown in Tables 1–4, has appeared logical, and the content of the curriculum has been considered reasonable in emphasis on principles, laboratory experience, and student participation in conferences and clinical experiences. Changes have already been made in many of the subject committees by new personnel who have introduced major modifications in the content and methods of instruction after reevaluation of the objectives of the program.

It is found that the multidiscipline laboratories are practical and economical because of centralized management and equipment and particularly because of continuous occupancy for 36 weeks in the year (14, 26) The ratio of instructors is approximately the same as previously, varying from one instructor for eight students to one instructor for sixteen students. Many more members of the faculty now participate in teaching than ever before because of the large degree of decentralization which results from use of the subject committee as a teaching unit.

Obviously, problems remain, such as coverage, teaching of the clinical specialties, coordination of interdepartmental teaching, and obtaining enough time for the student to learn biologic, behavioral, and clinical fields as well as to participate in the care of the patient. There are problems of the best manner for teaching in the basic clerkship and continuity programs in Phase 3.

It is recognized that an able faculty and an able student body can succeed in a program of education; but, in addition, it is believed that a well planned program or curriculum can offer the able student an unlimited opportunity for his individual growth while helping the less able student, at the same time, by providing him with a firm foundation for his learning. It is realized that the present organization of the School of Medicine at Western Reserve University and the current program represent just one example of many methods that are being employed in several countries to accomplish similar educational objectives in medical education.

The results of the program of medical education are being observed by the faculty and by the students themselves, through Student Committees on Medical Education in each class, by the use of National Board examinations, by the Bureau of Social Research of Columbia University (24, 28), and by a newly-formed Division of Research in Medical Education in the School of Medicine (9). It is believed that continuing research in medical education is as essential to this field as to any other.

Certain questions continue to offer a challenge in the future application of the approaches employed by the faculty in the program of medical education at Western Reserve University. Some of the broad and specific questions listed below are asked by many educational institutions, including medical schools:

1. Can the objectives of medicine and of medical education be defined clearly and in detail for the many aspects that constitute the program, usually referred to as the curriculum?

2. Can definitive objectives serve as a basis for research in medical education? Can methods of evaluating results be devised for study of the

effect of the educational program on students and their careers?

3. Can educational objectives be revised to be consistent with advances in the biologic, clinical, and social sciences and the application of knowledge to medical practice? Can revised objectives serve as an approach to the changing of a program of medical education in an orderly and, possibly, in a scientific manner?

4. Can the democratic approach give a faculty of medicine an effective method of governing itself in the conduct of its reponsibilities? Will the democratic approach preserve freedoms essential to the individual members of the faculty and still give an effective instrument for action? Can the democratic approach of the faculty be combined with research in medical education?

5. Will the organization in the School of Medicine at Western Reserve University be effective in providing a pattern for faculty self-government and for research in medical education? Will it continue to provide enthusiasm to its faculty members to teach? Will it provide adequate communications? Will it take more time than necessary for communication? How much communication is needed for an effective program of medical education that is evolving to keep up with advances in medicine?

6. Will the subject committee continue to serve as an effective method for interdepartmental cooperation and for the correlated teaching of several disciplines? Is the organizational structure too complicated to survive?

SUMMARY

In this presentation emphasis is placed on two approaches used by the General Faculty of the School of Medicine of Western Reserve University in the continuing revision of the program of medical education. First, the planning is done in a democratic manner with communication and participation by members of the faculty in the development of policy. Second, a sequence of steps has been developed to aid in the investigation of the program as it is devised, conducted, and as the results are obtained. It is recognized that the curriculum will always be changing, but the approaches of the faculty can be continuing and can be defined.

A description is given of the method by which the General Faculty has governed itself for the development of the program, the evolution of the objectives, and the detailed planning and administration of the curriculum. The educational environment of students is emphasized as related to treating them as members of a graduate professional school. The development of interdepartmental teaching, subject committees, and the content of the whole program is outlined briefly.

Questions are asked in the discussion concerning the future application of the approaches now being used by the faculty.

APPENDIX

TABLE 1

SCHEDULE OF SUBJECT COMMITTEES FOR PHASE 1 (FIRST YEAR)

Orientation	0.5 weeks
Cell biology	7 weeks
Tissue biology and neuro-muscular systems	6.5 weeks
Cardiovascular and respiratory systems	7.5 weeks
Metabolic, gastrointestinal, and renal systems	6 weeks
Endocrine and reproductive systems	4 weeks
Study period before comprehensive examination	10 days
Comprehensive examination	3 days

Biostatistics is taught during the first 8 weeks by a subject committee, and the student is introduced to the medical library by the librarian during the same period of time.

Anatomy of the infant cadaver is taught beginning with the tissue biology and neuro-muscular systems.

Clinical science is taught by a subject committee each week throughout Phase 1 with introduction of the student to growth and development of an infant by observing a normal mother during the latter part of her pregnancy, the delivery, and seeing the infant in the home and the Family Clinic.

A project is begun by each student with a faculty member in the second half of the academic year and is conducted all day Wednesday for eighteen weeks.

Free time is available on Tuesday afternoon and all day Thursday. Classes are held on Saturday morning.

Vacation occurs in the summer for eleven weeks. About half of the students elect to take summer research for two months and receive remuneration for it. Usually it is an extension of their project.

TABLE 2

SCHEDULE OF SUBJECT COMMITTEES FOR PHASE 2 (SECOND YEAR)

Mechanism of cellular and tissue injury and reaction	4 weeks
Chemical agents	2.5 weeks
Mechanisms of infection	4.5 weeks
Cardiovascular and respiratory systems	9 weeks
Hematopoietic system	4 weeks
Gastrointestinal system	7 weeks
Urinary system	3 weeks
Skin	0.5 weeks
Study period before comprehensive examination	7 days
Comprehensive examination	3 days

Anatomy of adult cadaver is taught beginning with the cardiovascular system and continued through the gastrointestinal system.

Psychiatry is taught by a subject committee for 1–2 hours each week.

Clinical science is taught by a subject committee for one afternoon each week in small sections of four students learning physical diagnosis under the guidance of a clinical preceptor. The infant observed in Phase 1 is followed in the Family Clinic.

The project is continued, as in Phase 1, in the second half of the academic year all day Wednesday for 18 weeks.

Free time is available for three afternoons during the week.

Vacation occurs in the summer for 11 weeks. As indicated above, many students do research full time during the summer for 2 months.

TABLE 3

SCHEDULE OF SUBJECT COMMITTEES FOR PHASE 2 (FIRST HALF OF THIRD YEAR)

Locomotor system	4 weeks
Nervous system	7.5 weeks
Endocrine system and metabolism	4 weeks
Human reproduction	4 weeks
Comprehensive examination	1 day

Anatomy of the adult cadaver is taught during the first two and last subject committees.

Clinical science is continued by the subject committee for one afternoon per week and permits the learning of examination of skeletal and nervous systems, and special senses. The infant observed in Phase 1 is followed together with siblings in the Family Clinic.

TABLE 4

SCHEDULE OF SUBJECT COMMITTEES FOR PHASE 3 (LAST 16 MONTHS)

Basic clerkship on medicine or pediatrics	4 months
Ambulatory clerkship (group clinic)	2 months
Obstetrics and gynecology clerkship	2 months
Surgery clerkship	2 months
Elective time	4 months
Vacation	2 months
National Board Examinations:	
Part I, June of third year	3 days
Part II, April of fourth year	2.5 days

Each clerkship is guided by a subject committee on each clinical service. Clinical science continues with the Continuity Clinic for each student on one afternoon a week for the long-range study of selected ambulatory patients, for the follow-up of the family, and the study in the prenatal clinic of pregnant mothers whom the student will deliver when he is on obstetrics.

In elective time the student may take pathology; clinical clerkships in medicine, surgery, pediatrics, medical or surgical specialties; research; may teach in Phases 1 or 2; or may go to another hospital or abroad.

Bioclinical study sections are conducted for 2 or 3 hours in each week during 12 weeks of the basic clerkship and again for a period of 16 weeks in the fall and winter. These seminars are for ten to twelve students in each group.

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Medical Education at Western Reserve University*

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Dissatisfaction with medical education is not something new. One has only to read early issues of the *Lancet* and local medical journals of 100–130 years ago to realize this, and even at earlier dates there were complaints in Britain about the quality of medical education. The formation of extra-mural medical schools was due directly to dissatisfaction with the teaching then provided in the universities. However, in this century, and especially since the last war, there has been an unprecedented concentration on medical education, and nowhere has this problem been tackled in a more imaginative and revolutionary fashion than at Western Reserve University.

It must be emphasized at the outset, however, that the situation at Western Reserve after the war was unusually favorable for experiments. The heads of most of the departments were changed over a relatively short period, and the newcomers were comparatively young men who were not bound by tradition, who were not imbued with ideas of building up little empires of their own with inviolate boundaries, who all felt the need for a new approach to the training of doctors, and who were prepared to shoulder the immense task of devising and putting into operation a new curriculum. The chances of a similar combination of events occurring in any other medical school must be almost as remote as those associated with winning a fortune in the football pools. Therefore the Dean, Dr. Wearn, had a situation—partly accidental in origin and partly, I suspect, created by careful planning—which was specially favorable for the introduction of the radical changes in medical education which were fermenting in his active brain. He found a most able adjutant in Dr. Hale Ham, who modestly disclaims any personal credit; yet those most familiar with the trend of events have no doubts about the importance of the part he has played in what is the most interesting experiment in medical education presently being attempted. The unique situation that existed at Western Reserve after the War, and the combination of men with ideas and ideals to profit from it, are unlikely to arise within the foreseeable future at other universities where most deans have to deal with faculties composed of men varying in age from the thirties to the sixties, some willing to experiment and others complacent about the existing situation. We must remember also that no British dean has the same powers or authority as most American deans.

The curriculum cannot be expanded indefinitely, and indeed it is already overloaded, for no student or doctor can absorb more than a fraction of the medical knowledge now available. As Hale Ham has indicated this fact was recognized and accepted by the planners at Western Reserve, and it was decided to concentrate selectively on teaching basic principles—the mechanisms of disease and practical procedures—while promoting the development of scepsis scientifica and the concept that true knowledge is acquired largely by a process of continuing self-education. Throughout the objective of helping students to develop their own abilities was to be kept in mind.

In brief, that is what the teachers hoped

* Remarks made in opening Discussion.

to accomplish; but what about those on the receiving end—the students? Are medical students sufficiently similar on both sides of the Atlantic to be subjected to the same program? This is a moot point. American medical students are on an average 3–4 years older than their British counterparts, they have completed 3–4 years' college training in the liberal arts, and some have already had experience in tackling minor research problems; thus they are more mature, they have usually sown any wild oats, they work harder and are more self-assured, and a high proportion are married with both husband and wife working full-time or part-time to help meet the heavy costs involved in American medical education. In discussing educational problems we must consider not only such factors as the curricular content, the arrangement of time-tables, the integration of various subjects, the teachers and the facilities available, but also the students: too often they are regarded as whipping-horses to be blamed when our efforts as teachers are unsuccessful. If there is a high failure rate it is common to hear remarks such as "they're a poor year" and seldom does anyone inquire "are we poor teachers" or "could our methods of teaching and examination be improved?" At Western Reserve and other American universities they would be horrified if they had the 25–40 per cent failure rates which are all too common in professional examinations in our universities, and which some examiners seem to regard as a matter for self-praise rather than self-blame. Why is there this difference? Is our raw material inferior? Are our selection methods defective? Are our teaching methods sound? Do we try to teach too much, overloading our students with the so-called facts of today which are often the errors of tomorrow? And are our examinations based too rigidly on traditional written and oral methods? After listening to Dr. Hale Ham you must realize that at Western Reserve and elsewhere in the United States there is more self-criticism about these matters than is common in our medical schools, and they evince a willingness to experiment and to submit their results to impartial evaluation which we might well copy.

Dr. Hale Ham explained how their experts planned their program and how they were guided by certain considerations such as indicating clearly the scope of what a student should learn by the preparation of special systematic and practical manuals; by providing tutorial supervision in all phases; by arranging adequate practice in the more common methods used in diagnosis, treatment, and research; by arousing deductive and critical faculties; by introducing patients to students at a very early stage; by stimulating interest and enthusiasm; and by inculcating the concept of the special individual and communal responsibilities of medical men. Those of us who have studied the program in action may feel that not all these theoretical ideals are fulfilled in practice; but there is no complacency at Western Reserve, and their curriculum is still undergoing modifications in the light of experience.

As we have heard, the Western Reserve program is divided into three phases: (1) a year devoted to the study of normal structure and function and problems of growth and development; (2) $1\frac{1}{2}$ years to alterations in these normal processes produced by disease and other causes; and (3) a final $1\frac{1}{2}$ years spent in studying the clinical applications of what the students learned in the first two phases. Other features such as free time and elective periods for projects selected for study by individual students are interesting, but these are common to many American universities and are not peculiar to Western Reserve. Actually, the so-called free time is seldom free for anything except study; and I was not always impressed by the attempts to turn so many students into research workers. I had the opportunity to talk to many students at Western Reserve and elsewhere about their research projects, and while some obviously had a good grasp of their subject, many were clearly being forced to run before they had learned to walk. This may sound cynical, but after 30 years' association with universities I doubt

if more than about 5 per cent of students in any average "year" are likely to become good research workers, and it is mistaken zeal to force the remainder into disciplines for which they have no real aptitude or adequate training. In some American schools 30–40 per cent of medical students are attempting to do research and contributing to our present excess of medical verbiage. Admittedly many American students are very good, but I still think the proportion attempting research is too high and that the elective projects are overdone.

The multidiscipline type of laboratory is used more extensively in Cleveland than elsewhere, and any university planning a new medical school must give very serious consideration to this development which may be seen in action at Western Reserve, Harvard, and elsewhere in the United States.

There is not time to consider the various phases in detail, so I shall mention briefly my impressions. In general most subjects are covered less fully than in British Schools, but some, and notably biochemistry and psychiatry, receive more attention, and the teaching of the preclinical and clinical disciplines is more closely correlated or integrated than it is in our universities. Thus there is less duplication and overlapping, and as American students seem to work harder they achieve more in less time than British students.

Every visitor, depending on his predilections, will have his own views on the relative emphasis placed on different subjects. Mine were that too little time is devoted to anatomy, physiology, pathology, and clinical work, and that, important as biochemistry and psychiatry are, they are accorded too dominating a role. Indeed it could be argued that the biochemists are guilty of the supposed sins of our anatomists, physiologists, and pathologists who are blamed for overelaborating details to such an extent that basic principles are obscured. Even with a selectively planned and integrated course, I do not think 4 years provide enough time for undergraduate medical education.

Other aspects of the course will be mentioned by Professor Arnott, so I shall conclude by saying how much I profited by visiting a dozen of the great American Universities—and not only by my studies of medical education, hospitals, and medical schools. At Cleveland, for example, besides seeing a good deal of Western Reserve University and its associated hospitals, I had the pleasure of enjoying the delightful hospitality provided by Dr. and Mrs. Hale Ham; of attending a baseball game with an enthusiast, Dr. Caughey; of participating in one of the best of many case conferences I attended, conducted by Dr. Schnapper of New York; of discussing Western Reserve ideas and ideologies with the Dean, Dr. Wearn; of spending an evening, which was disastrous both financially and gastronomically, with two Canadian Scots I met in the Hilton Statler Hotel; of dining with three medical students whose comments were shrewd, amusing, and uninhibited; and of spending an evening in a pub discussing many topics with Dr. Robens, a Nobel Prize winner—a unique experience for me and one unlikely to recur.

That is the kind of extracurricular instruction one is likely to obtain in Cleveland, Ohio, and as a means of broadening one's education it is scarcely less important than the many other things one learns by visiting a place brimming over with ideas, initiative, and enthusiasm such as the Western Reserve Medical School.

Discussion

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Professor Hale Ham's account of the Cleveland experiment has been fascinating and is an inspiration to us all. One feels that an essential factor in its initiation and development was the overwhelming number of new, young heads of departments who initiated and developed the scheme. Professor Hale Ham has, perhaps wisely, been somewhat vague as to how this was secured. Perhaps he might be persuaded to impart the secret privately, along with, of course, for one's own protection, the necessary antidote to the measure used.

Under the august stimulus of the General Medical Council's new recommendations most schools in this country are giving the medical curriculum a new look. With some it may be merely a turning from one side to the other without any real interruption of the pleasant complacent dream that little can be done to improve on a curriculum perfected and hallowed by countless decades. Other schools are in a mood to tear everything to bits and to build anew. These are inevitably hampered by the fact that, however much they may change the form and the order of their educational system, the same personnel will survive the cataclysm. However insulted and outraged many faculty members may feel themselves by the proposed changes it is safe to predict that none will resign in protest.

A problem which is particularly important to British medical schools at the present time is the relationship of the medical school to the whole university and, in particular, the relationship of the schools of medical sciences to the university, on one hand, and the medical school on the other. Ideally the medical school and its principal teaching hospital should be on the university campus. Medical students should, apart from the time they are working in hospital on resident clerkships, live in multi-faculty colleges or halls. This seems the only practical way in which medicine can share in the studium generale of a university. Nowhere in Britain is this ideal achieved, although in Birmingham it may come sooner than almost anywhere in that the Medical School, the University, and the main Teaching Hospital are all together. Plans for a great extension of residential accommodation are well advanced; the only lack is the money to build the halls.

This problem is particularly acute in the University of London with its twelve undergraduate medical schools. Some of these are already planning to move away from the centre in pursuit of their teaching hospitals which have, as the result of shifting population, to move out. Then the problem is whether the departments of anatomy and physiology should move with the rest of the school or should be centralized in close association with the other faculties of the university somewhat along the lines that exist already at Oxford and Cambridge. To make the medical school entirely self-contained means for its students virtually no opportunity of appreciating the meaning of a university or of gaining from association with other disciplines. On the other hand, to tear anatomy and physiology from the medical school is to deny any opportunity of integrating these subjects closely into the clinical fabric. In the United States such a problem can be and in several instances has been solved by rebuilding the teaching hospital on the university campus. Such measures

are in general far beyond our means, and meanwhile we are forced to make compromises and inevitably unsatisfactory arbitrary decisions.

Another formidable problem in medical education is the extensive degree of specialization that subdivides clinical practice. However much this has contributed to the advance of knowledge—in some instances it has retarded development—it constitutes a grave teaching problem. The argument is sometimes advanced that because this or that subject accounts for a substantial proportion of those presenting in a doctor's waiting room it should receive a proportionately prominent allotment of time in the curriculum. I personally hold that argument to be thoroughly unsound. Agreeing, as I am sure we all do, that the inculcation of the habit of logical scientific thought is the aim of medical education the extent to which subjects should receive emphasis should be in proportion to their scientific sophistication. Some subjects like neurology and cardiology are firmly based on a broad secure foundation of fundamental science, and for that reason it is right and proper that they should play a prominent part in medical education.

There is a real danger in presenting to the student the spectacle of a patient being shunted from specialist to specialist; he may well wonder who is taking the responsibility for the whole patient. In this respect a particularly important duty falls on the general physician. The way things are in Britain now it is only from a general physician that a patient gets a comprehensive assessment of his health situation. Traditionally all other types of specialists tend to view the problem in the light of their own specially developed knowledge and skills. For that reason the major portion of clinical instruction should be in the hands of general physicians. That does not, of course preclude such general physicians' being cardiologists, neurologists, gastroenterologists, even psychiatrists as well. The essential thing is that in undergraduate teaching they accept the responsibility for general care of patients and should have some hospital duty which involves unselected out- and in-patients with a reasonable proportion of emergencies.

The last point I wish to discuss is the examination system. American Medical Schools rely principally on continuous detailed assessment, that is, few examinations, or, if you like it, one continuous examination from beginning to end of the course. I feel sure we have not developed that sufficiently in this country. The system requires careful organization, constant supervision, and a high sense of individual responsibility on the part of all concerned. I should like to see it developed to the point at which it plays a part at least equal to that of the formal examination which I would still like retained but not as the sole arbiter.

Medical Education in Sweden
Report on the 1954 Reform

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To understand the aim and scope of the Reform of medical education instituted in Sweden in 1954, it is necessary to know the background against which the Reform had to be enacted. There are five places where medical training can be taken. The oldest is the Medical Faculty in Uppsala, where the university was founded in 1477 and medical training started little more than 100 years later. Next came the Medical Faculty in Lund and then the Karolinska Institutet in Stockholm, which is an independent medical school. After the second world war a new university with a medical faculty was founded in Gothenburg, and lately it was decided to establish a fifth medical school in northern Sweden. It is placed in Umeå, and teaching started in January, 1959.

Student Entry and Selection.—The students come directly from the secondary schools ("the gymnasium") where they take the "studentexamen," corresponding to the English matriculation examination. They are 19–20 years of age when they enter medical training. No special courses or examinations are required at the university, and thus there is no medical college between the gymnasium and the medical faculty. Only a limited number of students is taken each year. The competition is severe, and regularly 2–3 times as many apply for admission as can be taken. The intellectual standard is thus good among the medical students, and, if graded according to their school marks, they belong to the upper third of the whole student body. The total number of students admitted is 408 each year. Of these, the Karolinska Institutet in Stockholm takes the most (140) while Uppsala takes the least (90). No students begin their medical course in Umeå: they move there after the first 2 years.

In selecting the students, the University relies exclusively on the marks given in school. The competition is based on the original marks, and these cannot be altered in any way. Whatever type of matriculation examination the student may have, even if he has studied classical languages and general humanistic subjects, these marks will be counted in the competition. A student with good marks in such subjects may thus beat a student with low or mediocre marks in the sciences. However, the student must have a knowledge of certain science subjects, i.e., mathematics, physics, chemistry, and biology; but a student who does not have them in his original matriculation examination needs only to come up to minimal requirements, and the marks thus added do not figure in the competition mentioned above. We face the fact that medicine is a wide and differentiated field, and personalities of many different types are needed in medical work, those with a humanistic inclination no less than those with a scientific one. An intelligent young man or woman, no matter how he or she has proved this, will become a good student and probably a good doctor if sufficiently interested.

Control of Medical Education and Reform of the Curriculum.—All universities are owned and supported by the government. This means that any reform, which of course

always implies higher costs, must be accepted by the government. However, the government in its turn always relies on the governing bodies of the universities to ascertain what is the wise policy in education. All in all there are some 180 members of medical faculties in Sweden. A vast majority of all these people must agree to any proposals if these are to win the consent of the government. It is easy to understand that in this situation the policy in planning a change of medical education must be to institute as thorough a reform as possible and not to attempt a revolution which is never carried by a majority vote.

It is perhaps of some interest to mention how the plans for the new curriculum were worked out. In 1948 a Royal Committee was established. It consisted of a chairman who was a high administrator in the department of finance and had no medical training whatsoever, but, being an excellent administrator, was able to lead the committee in a very wise way. The members were five professors representing the subjects of internal medicine, surgery, psychiatry, and ophthalmology, one head of an internal medicine clinic in the countryside to represent the points of view of physicians working in the practical field, one associate professor in anatomy (myself) to represent the younger teachers, one medical student, who had worked for some years in student politics, and one member of parliament. Several of the committee members had traveled in Great Britain and United States specially to study medical education.

The committee started work with discussions about the principles of a new curriculum. The existing regulations were from as long ago as 1907 and were defective in many ways. Many medical disciplines had grown since that time, and there were no set rules concerning such subjects as, for instance, bacteriology and neurology. The importance of preventive work was not specifically stressed in the curriculum, nor were the health needs of the individual in a modern society specially considered. There were no stipulations about collaboration between teachers, and very closely related subjects might be taught without any attempt at integration. On the other hand there were good features worth preserving such as the great stress put on practical work in all subjects and especially in the clinical ones, with bedside teaching as a characteristic.

In the new curriculum the committee tried to keep the best of the old tradition, to modernize the content of medical education, and to take into account the needs of medical care in a modern society. This new curriculum was then presented in personal interviews to all the members of the medical faculties around Sweden. Their reactions and suggestions were noted. After these discussions the committee went over the curriculum again, changed it in a number of ways, and came back to all the teachers one by one. After this second check the committee again made alterations on many points. When for the third time the committee consulted the professors one by one, it presented to them proposals for the staffing and equipment of their institutions or clinics under the reform. After these consultations the committee finally settled its plans. Its final report was handed over to the government in 1953.

The government sent the proposals officially to the medical faculties and heard their reactions. Because of the extensive discussions and consultations before writing the report, the faculties felt a certain responsibility for the new plan, and it was accepted with very few suggestions for changes and surprisingly little resistance. The proposals were then accepted by the government and then by the parliament in 1954. For Swedish circumstances the reform was rather costly, since it proposed nearly 200 new posts from professors downward to technical personnel. The increase of the yearly budget of the medical faculties was about 2,000,000 Swedish crowns, which is approximately the cost of an entire faculty distributed among the four then in existence. The new curriculum began to be used in 1955, and the clinical courses at the end of the study will be the last part of the curriculum to be changed

during the present academic year. From the summer of 1959 the whole medical study in Sweden will follow the reformed plan. The switch-over has been relatively uneventful and has presented fewer problems than might have been expected.

Medical education in Sweden, as in other countries, covers a great number of years and consists of different phases. As can be seen from Table 1, it consists of undergraduate studies, postgraduate studies, and refresher courses. The reform to be described here concerns only the undergraduate studies. The postgraduate studies, which are controlled by the Swedish Medical Association, are now under discussion, and their definitive form is not yet decided. The undergraduate studies cover a period of 6½ years, after which follows a period of 5 years of training in clinical departments, where the doctor works as an assistant clinician. The refresher courses are given at irregular intervals and are designed to cover modern developments in various clinical fields. They are administered by the Royal Medical Board.

TABLE 1

MEDICAL EDUCATION IN SWEDEN

	Undergraduate Studies (Grundutbildning)	Postgraduate Studies (Vidareutbildning)	Refresher Courses (Efterutbildning)
Time:	6½ years	About 5 years	1–3 weeks every 5 years
Institution:	University Departments and Clinics	Specialized hospital departments (University and others)	Central Hospitals (*in rota*) (Stockholm-Uppsala, Lund-Malmö, Göteborg, Linköping)
Status:	Undergraduate	Assistant clinician	Specialist on Study Leave
Aim:	Basic theoretical and clinical training	Specialization in clinical fields	Modern Development in Particular Fields
Responsible authority:	University	Swedish Medical Association	Royal Medical Board

The Aim of Swedish Undergraduate Medical Education.—The undergraduate studies, according to the reformed plan of medical education, should give basic theoretical and clinical training. It is important to fix the aim of this training period squarely and adequately. Earlier the aim was to produce a doctor who, immediately after examination, could go into general practice and take the responsibility for the medical care of a large and varied clientele. Now it is expressly stated that the aim of the undergraduate studies is not so high. It is thought to be impossible to produce in the medical school a doctor with large enough practical training to make him capable to work in general practice. Some practical training, however, has to be included in the undergraduate studies because the graduate must be able, after his university examination, to take up work in hospital as a junior clinician. On the other hand, the doctor is definitely urged to go on for several years in postgraduate studies to acquire thorough clinical training.

The situation is admittedly somewhat illogical at present, because the undergraduate period is constructed with the idea that the doctor should carry on in the hospital for some years as junior clinician, but according to the law he may work in general practice immediately after the university examination. This should be corrected when new rules for postgraduate education are given. Anyway, it is impossible to construct a rational undergraduate curriculum if the knowledge accumulated during the postgraduate studies is not taken into consideration. To limit the extent of the undergraduate period it is absolutely necessary to balance it against the postgraduate years.

The Plan of the Undergraduate Course.—The undergraduate studies are schematically shown in Table 2. They cover 6½ years, divided into several parts. First, there is a preclinical period, covering 2 years of mainly theoretical subjects. This period is finished by an examination called in Swedish "medicine kandidatexamen." The student must

pass this examination before he can go on to the second part of the undergraduate studies. This period is mainly concerned with introductory clinical studies and with various clinical disciplines. It is divided in its turn into three parts. The first part covers 1 year and is called the "propaedeutic year." It is an introductory year where, besides more theoretical subjects like pathology, bacteriology, and pharmacology, introductory clinical courses are also given. These studies must be finished and the examinations satisfactorily passed before the student advances to the second part, where the special clinical courses are assembled. This second part starts with 1 year devoted to internal medi-

TABLE 2

UNDERGRADUATE STUDIES

Term	
I–II	Anatomy—Histology Medical statistics—medical genetics
III–IV	General chemistry—medical chemistry Medical physics—physiology Psychology
	Degree of Bachelor of Medicine (Medicine kandidat)
	First part
V–VI	Propaedeutic year; Pathology Bacteriology Pharmacology Introductory courses in Internal Medicine, Surgery, Social Medicine, and Roentgenology Clinical examination methods Clinical laboratory course Demonstration course in nursing etc. and Physical Therapy
	Second part
VII	Internal medicine (5 months)
VIII	Surgery (5 months)
	During courses in internal medicine and surgery special teachers currently give lectures and conferences: Clinical chemistry Clinical physiology Clinical bacteriology Roentgenology Radiotherapy Pathology conferences Therapy conferences
IX, X, XI Study plan not fixed, subjects may be combined, minimum time 16 months	Dermatology-venereology (2 months) Clinical epidemiology (2 months) Ftisiology (1 month) Ophthalmology (2 months) — Two courses may be combined Otorhinolaryngology (2 months) Hygiene (2 months) War Medicine (1 month) Obstetrics-Gynecology (3 months) Neurology and Psychiatry (3 months) Pediatrics with Child Psychiatry and Social Medicine (4 months) Forensic Medicine (may be combined with all other courses)
	Third part
	Internship period: 4 months internal medicine 3 months surgery 2 months elective clinical subject
	Degree of Licentiate of Medicine (Medicine licentiat)
	Medical registration

cine (5 months) and surgery (5 months). During this year correlated teaching in various subjects as, for instance, roentgenology and pathology is given.

Then follows a period of a little more than 1½ year when the student studies the specialized clinical sciences like dermato-venereology, clinical epidemiology, ophthalmology, obstetrics, pediatrics, etc., and also takes some other subjects such as forensic medicine, social medicine, and hygiene. He is now examined in all subjects except internal medicine and surgery and can then pass on to the third part of the clinical period. This part is an internship period and constructed much as a rotating internship in the U.S.A. The student takes these months in hospitals other than university hospitals, and he must devote 4 months to internal medicine, 3 months to surgery, and 2 months to an elective clinical subject. After this training period he comes back to the university and has to pass examinations in internal medicine and surgery. He is then ready for the final examination, which is in Swedish called "medicine licentiatexamen," and then gets the title of "Medicine licentiat." This university examination gives him the right to medical registration and to practical work as a doctor.

Details of the New Curriculum.—first year: The various years of the undergraduate studies will now be briefly discussed, and the changes compared to the old order of studies will be pointed out. During the preclinical period the first year is devoted mainly to anatomy and histology, taught at two different institutions. New subjects during this year are medical statistics and medical genetics, in which the student gets short courses intended as surveys giving only principles. Medical statistics also includes description of planning of experiments and of clinical research. The student should early recognize the importance of these principles, and the teachers in the later disciplines should then apply these principles to their special subjects.

Second year: The first half of the second year is devoted to chemistry, when courses in general chemistry and medical chemistry are given. Medical chemistry means roughly the same as biochemistry applied to medicine. During the second half the student takes courses in medical physics and physiology. Medical physics is a new subject in this plan. It has a laboratory course of 1 month and is closely correlated with physiology. It should not be merely instrumentation but rather general physiology, dealing with the principles of physics which are of importance in biology and physiology. At the end of this year a short course in general psychology is given, in which the principles of psychology are taught by a member of the department of psychology.

No very intimate correlation or integration between the preclinical subjects has been attempted. This is simply because most of the teachers did not want to have such an integration. On the other hand, it is definitely stated that various types of collaboration and integration between the subjects are allowed. It often happens that parts of the subjects are exchanged between teachers so that a teacher specially interested in some part of the related subject teaches the whole field. No patients are shown during these two clinical years. On the other hand, it is possible to have a roentgenologist or an orthopedic surgeon give lectures during anatomy, or to ask an internal medicine specialist to discuss problems during the courses in medical chemistry or physiology. Patient demonstrations might be instituted on such occasions, but this has not been done so far.

The examination system: One reason for not trying to make any more complicated integration between the theoretical subjects is that medical teachers in Sweden are traditionally accustomed to teach according to the "block system," that is, to have the students exclusively concentrate on one subject or at least on only two subjects during a given period of time. This is of course advantageous to the teacher, who can arrange his teaching in a very effective way. It is also advantageous to the student, because the examination system is adapted to the system of block teaching. In Sweden each sub-

ject is examined separately and at any time after the student has passed the practical course in the subject in question. When all the teaching and practical work belonging to a certain subject has been passed by the student, he may at any time ask for the examination. The teacher is then under the obligation to perform this examination within 2 weeks after the request. The examination is done in private with only the teacher and the student present. It may comprise practical tests or a written examination but may also be wholly oral. The examination is always finished by an oral examination.

If the student passes the examination, his mark is written down in a book where all the testimonials are collected. He then does not need to do more in this particular subject. If the student fails, he is allowed to repeat the examination as many times as he needs to pass it. The only limitation is that he cannot ask for an examination more than twice each term. This system is admittedly very liberal to the student, since it enables him to take the whole curriculum so to speak piecemeal, and also because the faculty never sends a student away because he has failed once or twice in an examination. The system has worked well, and there are no proposals from either teachers or students to change it. In our experience in Sweden, a student practically never breaks off his medical studies on account of intellectual shortcomings but almost always because of temperamental or personality difficulties or sickness. When the student has passed all the examinations required for the final degree, he hands in his examination book to the faculty and then gets a formal statement that he has passed the final examination and is now declared a "medicine kandidat" or "medicine licentiat," as the case may be.

The third year: After "medicine kandidatexamen" comes the clinical part of the study, which consists of three parts. The first part covers a year, the third study year, and is called the propaedeutic year. It is an introductory period to the clinical study proper. It consists of more theoretical subjects on the borderline of clinical medicine, that is, pathology, bacteriology, and pharmacology. Among these subjects pathology is the longest one, and it is taught during most of the propaedeutic year. Bacteriology comes as a shorter course in the beginning of the year and pharmacology as a somewhat shorter course at the end. During all this year, and concurrently with the subjects just mentioned, there are a number of introductory clinical courses or more practical laboratory training courses. The introductory courses are in internal medicine, surgery, roentgenology, and social medicine. It is suggested that these courses should be spread over the whole year in such a way that these subjects can be made to fit in with the main teaching in pathology.

The practical courses are in clinical examination methods and include all the clinical examinations a doctor may perform on a patient, such as physical examination of the heart and lungs, simple neurological examination of reflexes, palpation of the abdomen, etc. During this course the student is also instructed in how to take a case history, and how to write it down. Then follows a clinical laboratory course, when the student has to practice the chemical tests he must know and use during his later clinical study. This will include tests for the examination of blood, urine, feces, etc. The last course is concerned with demonstrations in nursing and in the methods of physical therapy. Here all the practical details required in the treatment of the patient in hospital are demonstrated, and in some instances training is given in them.

Table 3 shows an example of the arrangement of all the courses and how these hours can be spread over the year. No definite order of the courses is forced on the faculties, however, so that they are free to arrange the whole study during this year in the way they deem best. It is obvious that quite a high degree of collaboration and integration must be attained if the courses are to be arranged in the right manner. Examinations are required in pathology, bacteriology, and pharmacology, and also in the courses of clinical examinations and clinical laboratory

TABLE 3

EXAMPLE OF ARRANGEMENT OF COURSES DURING A PROPAEDEUTIC YEAR

Months	Pathology		Bacteriology		Introductory courses		Clinical examination methods	Roentgenology	Clinical laboratory courses	Demonstration course: nursing, etc., and physical therapy	Pharmacology		Total hours
	Lectures	Anatomy demonstr.	Lectures	Laboratory work	Social Medicine	Internal Medicine	Surgery				Lectures	Demonstrations	
I	25	12	25	15	15								92
II	25	13	25	15		10	10						98
III	13	12				10	10	25					70
IV	17	13				5	10	20	20				85
V	18	12				10			20				75
VI	12	13				10		15	20				55
VII										20	32	18	70
VIII											32	18	50
Total hours	110	75	50	30	15	45	30	45	15	60	20	64	36	595

methods. Otherwise all the teaching is of the survey type, and it is hoped that the students will follow it attentively even though they are not examined, since they know that this knowledge will be of practical use to them during the coming years. During the propaedeutic year the students come into contact with patients and begin examining them. The teaching load of the propaedeutic year is, as can be seen from Table 3, around 600 hours. The rest is "free time" for the student.

The 4th year: The second part of the clinical period starts with a year, devoted to internal medicine (5 months) and surgery (5 months). The main teaching is devoted to the subjects mentioned and consists of clinical and policlinical lectures, patient demonstrations, ward rounds under the guidance of an experienced teacher, and practical work by the student in wards and polyclinics. Great weight is attached to the idea that the student should have a good opportunity for doing practical work. Each student during successive periods is attached to a special ward or to a special part of a polyclinic. There he sees all the patients coming for medical care, and he examines them, takes down their history and then presents his results to the doctor in charge. The doctor and the student then discuss the cases, and the results of the student are checked. Therapy is decided in common between them. In this way all the case histories written in our teaching hospitals are taken down by the students, and we feel it very important that the student should know that he is taking down the original histories which are being kept in the hospital.

During this period additional teaching is done (see Tables 4 and 5). In roentgenology lectures and demonstrations cover both courses. The subject has been extended in view of the importance in clinical work of this diagnostic method. A lesser amount of teaching is given in clinical chemistry, clinical physiology, clinical bacteriology, and pathology. The teachers in these subjects are heads of routine diagnostic laboratories and have academic status as full professors.

Their teaching is not too large, but it is considered very important because it presents a specialized modern diagnostic development. It can be arranged either as lectures or demonstrations or as conferences with clinical teachers attending. The choice here is up to the teacher.

During the course in surgery special teaching is given in radiotherapy, with diagnosis of tumors especially stressed. An important subject during this course is orthopedic surgery. In most cases both acute and conservative bone surgery comes under the responsibility of the orthopedic surgeon. Also some other conferences are given during this period. Thus, there are a series of conferences in therapy; every week all the students of internal medicine and surgery together attend a conference covering at least 2 hours, when main clinical themes of common interest to the two subjects are discussed. This large clinical conference is arranged alternatingly by the professor in internal medicine and the professor in surgery.

Also during this period of study a fairly close integration between various collaborating teachers is strived at. Through the conferences the student should come to understand that a case, a patient, is not something to be looked upon from the view-point of any single discipline but as a whole man who must be treated with the knowledge of many specialized disciplines kept in mind. This is apparent to the student in a very concrete way, when several clinical teachers from different disciplines come together discussing the patient in question. Integration is also taught in another way. The lesser subjects of this period are not examined separately but only by the teachers of medicine and surgery who cover all that has been taught during their courses. Also, the examinations in internal medicine and surgery are delayed and cannot be taken until the student has passed the examinations in all the different special clinical subjects and has

TABLE 4

EXAMPLE OF WEEKLY ROUTINE DURING COURSE IN INTERNAL MEDICINE

Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
09.00–11.00	Clinical chemistry of physiology or bacteriology	Clinical lecture	Visiting round at special departments or clinical demstrations	Clinical lecture	Clinical lecture	Conjoint conference (internal medicine and surgery)
12.00–13.00	Policlinical lecture	Pathology or Therapy conference	Policlinical lecture		Policlinical lecture	
13.00–14.00				Roentgenology		
14.00–	Practical work in wards or polyclinics					

TABLE 5

EXAMPLE OF WEEKLY ROUTINE DURING THE COURSE IN SURGERY

Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
09.00–11.00		Clinical lecture		Clinical lecture	Clinical lecture	Conjoint conference (internal medicine and surgery)
12.00–13.00	Policlinical lecture		Policlinical lecture		Policlinical lecture	
13.00–14.00	Roentgenology		Pathology conference	Roentgenology	Policlinical lecture	
14.00–15.00					Clinical chemistry or physiology or bacteriology	
15.00–	Practical work in wards or polyclinics					

also made a period of practical work in hospitals other than university ones. The purpose of this arrangement is that the student should mature before he returns to the final study of internal medicine and surgery. It is felt that these subjects form the very backbone of the undergraduate studies, and the students when studying these subjects should benefit from the experience of other closely related subjects.

The 5th and 6th years (18 months): After the fourth study year, just described, the student goes on to the specialized clinical disciplines during a period of about 1½ year. These subjects are enumerated in Table 2, where the time for each course is also given. It is seen in this table that the clinical subjects with special courses are dermatovenereology (2 months), clinical epidemiology (2 months), phthisiology (1 month), ophthalmology (2 months), otorhinolaryngology (2 months), obstetrics-gynecology (3 months), neurology and psychiatry (3 months in combination), and pediatrics with child-psychiatry (4 months). There are also courses in hygiene (2 months), war medicine (1 month), and social medicine (concurrently with the course in pediatrics), and forensic medicine. Some of these subjects are looked upon as being more important than the others. Thus, pediatrics has been increased compared with the earlier curriculum partly because a good knowledge of pediatrics is especially important from the viewpoint of preventive medicine. Also, the importance of social relationships has for a long time been well understood in pediatrics, and it has been found advantageous to combine this course with the main teaching in social medicine. This is because the study of social medicine should be a clinical one and practically oriented. Also, the course in psychiatry has been greatly extended, something which reflects the increasing importance of mental health in modern society and the need for the doctor to know more about minor psychiatric disturbances. The study of psychiatry is combined in an obligatory way with the study of neurology, which should help the student to acquire an integrated view of all the diseases of the nervous system.

The teaching in child psychiatry represents a new subject in the curriculum. According to the plan accepted by the authorities a special clinic and a professorship in the subject will be instituted in all the centers of medical teaching. The course in child psychiatry has been combined with the course in pediatrics, thus separating both the clinic and the teaching of child psychiatry from the psychiatry of the adult. After discussions for many years this arrangement has been agreed upon by both pediatricians and psychiatrists.

Such specialized clinical subjects as otorhinolaryngology, ophthalmology, dermatovenereology, and obstetrics-gynecology have been shortened in the new curriculum. The reason is that medical care in these specialized disciplines can be had all over Sweden, and the doctors trained for other specialities or for general practice are then requested to send such patients to the relevant specialist; in their own teaching they need only to get basic knowledge. In obstetrics, for instance, more than 95 per cent of all patients are delivered in hospitals. Also hygiene and forensic medicine have been diminished, following the creation of the new subject of social medicine, which has taken over some material from the other two disciplines. Other new subjects are clinical epidemiology and phthisiology. Clinical epidemiology is mainly concerned with the epidemic diseases, but probably this subject will develop into a discipline treating the acute infections generally. Phthisiology is specifically dealing with tuberculosis of the lung. This disease is diminishing rapidly in Sweden, but it is still a fairly common disease. Also, it is a subject in which much preventive clinical work has been done, and this aspect is considered important throughout the whole new curriculum and can be well illustrated in the subject of phthisiology. Every medical student should know how the dreaded disease of pulmonary tuberculosis has been and is being defeated.

War medicine is another addition to the curriculum. This might seem a subject quite foreign to the peaceful study of medicine.

However, about one-third of the Swedish medical students are female and another small percentage are exempt from military training. In modern warfare the civilian population is attacked, however, and also those doctors not doing military service must have a basic knowledge of the situations arising during a war or when there is an imminent danger of war. War medicine is a course concerned with the medical aspects of atomic and bacteriological warfare. It treats the health problems of mass evacuations from cities and the refugee problem. The organization of military and civil medical care in time of war is of course also an important subject. The treatment of mass casualties after heavy bombing, perhaps in combination with the use of atomic weapons, is being discussed. Demonstrations of films, material to be used in situations mentioned above, etc., are shown during the course. All medical students must take this course, and those who will later get military training can then concentrate this training on other aspects of war medicine.

A most important addition to the new curriculum is the subject of social medicine. The starting point in the discussion around this subject has been the consideration that the field of preventive medicine can be divided in a schematic way between the two subjects of hygiene and social medicine. In hygiene the teaching will be concerned with the external, dead environment of man. The problems of the disposal of sewage, the fighting of rats, field epidemiology, housing problems, the hygiene of clothing, nutritional hygiene, etc., will be discussed during this course. The subject of social medicine, on the other hand, should be dealing with the social environment of man and all those relationships of human beings to each other and to the society at large which are important in the clinical handling of a patient. Problems discussed are the social situation of the patient including the importance of economically satisfactory conditions, how people may get out of work, how their capabilities in relationship to their jobs affect their health, how the individual human being develops into a social being, the relationship between an individual and his family group, the changing situation during the periods of youth and aging, etc. Other important points in this teaching are the questions of vital statistics about the population, such as age, nativity, division on work groups, and the reasons for illness and death in our society. Great stress must be put on the ways of fighting the major illnesses, that is, preventive medicine as applied to tuberculosis, rheumatic disease, heart and circulation diseases, etc. Industrial medicine and rehabilitation will be discussed. Another aspect of social medicine is the various forms of social delinquency, such as poverty, unemployment, alcoholism, criminality, prostitution, vagabondry. The importance of environment contra constitution will be discussed, and the problems of abortion and sterilization also belong here to a certain extent. Another aspect is what the doctor has to do about insurance, pensions of various kinds, etc. Of course also all regulations and laws governing the work of the doctor will be treated here.

The teaching of social medicine is a typical subject for collaboration and integration. Thus, this teaching occurs on several levels in the new curriculum. An introduction with a discussion of the taking of a social case history is given during the propaedeutic year. Then conferences arranged in collaboration between the professor of social medicine and the teacher in question are arranged during the different clinical courses, and of special importance are the conferences given during the courses in internal medicine and surgery. It is expected, however, that the professor of social medicine keeps in touch with the various specialized clinical teachers and tries to find out whether his help is needed in a given subject or whether the teacher himself wants to give also the more specialized social medicine aspect on his subject. Then as a final part of the teaching of this subject comes the course in social medicine itself, which is obligatorily combined with the course in pediatrics. During this final course reviews, discussions, lectures, and demonstrations of various topics in social medicine are given, and the examination after this

course also covers the knowledge of all laws which the doctor must know in his work. It is very much stressed in the new curriculum that social medicine must be a clinical subject, devoted to the clinical aspects of preventive work at large. It is also stressed that the teacher in social medicine must be a clinician with scientific work of value in some clinical discipline, besides his research in social medicine proper. There is no limitation to what discipline should foster him clinically, but it is thought that in most cases the teachers in social medicine will be recruited from the fields of internal medicine, pediatrics, and psychiatry. Each medical faculty will have a professor and an institution of social medicine, and two of these professors have already been named. One of them began his career as a pediatrician and the other one in internal medicine.

During the period of study concerned with the specialized clinical disciplines the student has, as already mentioned, a good opportunity to arrange his studies in the way best suited to himself. Some of these subjects can only be studied separately from one another while some are combined in an obligatory fashion. Those subjects which can be combined according to the student's own choice can only be taken two at a time. They can also be taken separately if the student so chooses. He may also take them in the order which he finds most suitable, with the exception of the course in pediatrics and social medicine, which must come late. During this period it is thus possible for the student to insert periods of reading or of practical work between his courses and to keep a quicker or slower pace. It is quite common for a medical student to take several month's work in different hospitals and even, when he is close to his final examination, in general practice as a substitute for a doctor on leave. This is possible because there is such a shortage of doctors in Sweden. It is considered a good thing for the medical student, because in this way he gets an added experience of practical medical work, and he comes back to his studies with a better understanding of what his needs will be when he leaves the university. He can also in this way help finance his studies by his earnings during the periods in practice.

The seventh year: The third part of the clinical period contains a period of practical work as junior assistant "assistenttjänstgöring," or the internship period (9 months). During this time the student is requested to work for 7 months in internal medicine (only the last month of this period may be taken at the university hospital), for 3 months in surgery, and for 2 months in an elective clinical subject. In this way the student is sent out of the university hospital into an environment where he will be requested to do a lot of practical work and thus get added experience and practice. The hospitals where he is allowed to work during the internship period are listed by the university chancellor after consultations with the medical faculties. As has been mentioned earlier he is not allowed to undergo the examination in internal medicine and surgery until he has passed his internship service in the respective clinics. After these examinations the student has fulfilled all the requirements for his final examination, "medicine licentiatexamen," and he is given his diploma by the medical faculty. He is then registered in the Royal Medical Board as having the right to work as a doctor.

Relationship of Undergraduate to Postgraduate Studies.—As can be understood from this short description of the new Swedish curriculum, it is a mixture of an older, more traditionally conceived type of teaching and a more modern one. The important points stressed in the new plan are practical work in all theoretical and clinical subjects and especially work with patients; added importance to the specialized laboratory disciplines aiding in diagnosis and therapy; added stress on the preventive methods in medicine and on all the needs of the patients in a modern society. Also, collaboration and integration between the different teachers are requested, and realized especially in the clinical part of the curriculum.

The undergraduate studies described above are the basis of the future specialized training of the doctor. It is considered in Sweden that, no matter what part of medi-

cine the doctor will want to pursue during his practical career, he will need a period of postgraduate study after his years in the university. It is explicitly stated in the government report to parliament concerning the new medical curriculum that the aim of the undergraduate studies should only be to prepare the doctor for the coming years of postgraduate studies, after which he would be ready to take up independent medical work. The logical conclusion of this would be that the postgraduate education should have been reorganized at the same time as the undergraduate one. This was not done because of many different circumstances but especially because the Swedish Medical Association rather than the government is responsible for postgraduate education at present. The Swedish Medical Association has, however, now undertaken committee work to elucidate the situation and to make recommendations as to the postgraduate period.

At present a doctor is required to work in hospitals as a clinician for about 5 years before he is recognized as a specialist. Depending on the type of specialty the doctor chooses, he has to spend most of his time working in the clinics of the relevant subject. No formal examination is required. It is probable that the new rules of post-graduate education will be looked over generally as to the type of hospital practice required in the various specialties. It will also include at least one and possibly more special short courses in university clinics, followed by an examination. For the doctors working as "provinsialläkare" or "stadsläkare" (that is, medical district officers with some public health responsibilities but mostly work in general practice) there are postgraduate requirements fixed by the government. Three years of service in important hospital clinics are required, and also a course of 3 months, especially concentrating on questions of hygiene, social medicine, and forensic medicine. The postgraduate education of the general practitioner is not yet fixed either. The proposals made so far envisage 2 or 3 years in hospital wards. Most of this time should be in clinics of internal medicine or surgery with a little psychiatry and the rest on elective clinics. No formal examination has been discussed for the general practitioner. Thus, the field of postgraduate education in Sweden is in a rather indeterminate state, but the whole question is now being reviewed, and proposals will be put forward in the near future. All such proposals will be based on the new undergraduate curriculum as the common training of all doctors, and will require special lines of postgraduate education in hospitals and possibly also some formal teaching for the various types of specialists.

The need for refresher courses for specialists and general practitioners has been recognized already in the past, and the Royal Medical Board annually arranges such courses, specially designed for medical district officers but also open to others. It is being proposed that more such refresher courses be organized and that they be varied in length and content to suit the various types of specialized doctors who might need to take them. Tremendous possibilities will open up if hospitals in university cities and elsewhere are used. Such refresher courses are at present not obligatory for any kind of doctor, and no proposals to make them obligatory have been put forward.

It is yet too early to say what the result of the new curriculum in Sweden will be; whether the medical profession will feel that the new doctors are much the same or very different from the old ones; or whether they will look upon them as more or less qualified for their job than those who were trained earlier. Taking into consideration the responsibility felt by the whole medical profession for this question and especially by the medical faculties, it is not too optimistic to hope that the result will be favorable. The new reform of undergraduate studies has resulted in a frame inside which the teachers have great freedom to arrange their teaching in the manner they find best. It will certainly be possible to find by experiment and experience the best way of putting the time given to the greatest advantage.

Discussion

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The first comment I wish to make concerns the Aim of Undergraduate Education in Sweden.

A large country with a small population and a shortage of doctors needs G.P.'s of all around ability. Sweden feels that the way to get them is not by a comprehensive training, but by education.

The aim, therefore, is to give the student a foundation which can be a basis for all forms of practice. This is virtually the same aim as that set us by the General Medical Council's Recommendations. It is a large and perhaps ill defined aim, but we can break it down a bit further. It is clear that this foundation must include:

1. Proficiency in clinical method.
2. The ability to think scientifically, a scientific method of thought, as defined yesterday by Sir George Pickering, science as an attitude of mind.
3. The ability to learn; and we should bear in mind Dr. Malleson's comments on how little is done to guide the student toward facility in learning.
4. The acquisition of knowledge.
5. An understanding and an acceptance of the professional responsibilities of Medicine.

These seem to me to be the five educational objectives of what Professor Rexed has called "the reform" of the undergraduate period in Sweden. As he said, no attempt has yet been made to reform the postgraduate training. But there has long been a tradition in Sweden that after qualification a man will spend at least 4 years in hospital appointments before going out on his own. This was so while the curriculum was of 8 years' duration, and it is not likely to be less so now. Therefore, the problem of how far each objective shall be pursued in the undergraduate phase (how much knowledge, what degree of clinical proficiency) is largely theoretical—and limits are not set by an examination like our Finals.

These five objectives immediately pose that primary problem of medical education which Dr. Bowers described yesterday as the need to marry in the student's mind "scientific understanding" with the "clinical art." The Swedish curriculum is the result of thought and not of evolution, and has been devised so as to answer this problem. We ought to try to assess it in terms of how far it succeeds in doing so.

From what I have seen of Swedish medical education, I feel no doubt that it does succeed in marrying clinical art and science to this extent—they are far less divorced than they are in England, where the decree is made absolute by the Second M.B.

I have asked myself how much of this marriage, or absence of divorce, is due to (*a*) teaching and teaching methods and how much to (*b*) the curriculum.

At the outset I would say that in Sweden (as in Western Reserve) there is less confusion than here about that problem of teaching which came to the fore in discussion yesterday—the battle between instruction and other aids to learning. It is accepted in Sweden that many techniques of teaching are necessary, but that the technique of instruction is more relevant to some objectives than others, and that to achieve the other objectives other techniques are required. And an answer, if only a partial one, is given to a question asked yesterday—"How can you teach a man to learn?"

This answer is: "You must give him an indication of what to learn, incentives for learning it, and do what you can to help him over his personal difficulties in doing so."

Some of the success of Swedish medical education is, I believe (like much of the success at Western Reserve), due to a deliberate and conscious ranging of teaching methods alongside objectives. Thus, (*a*) proficiency in clinical method will be achieved by instruction, by constant practice, and by observations of good example; (*b*) scientific method of thought, learning how to learn, and factual knowledge will be achieved by giving the student good and powerful incentives for doing so; and (*c*) his preparation as a professional person will be best achieved by contact with doctors for whom he carries out professional responsibilities.

Next we must consider how far the curriculum, the actual arrangement of studies, is responsible for the successful marriage of scientific thinking and clinical skill. It is a very different arrangement from that of Western Reserve—where undoubtedly there is a successful marriage also.

I would like to suggest that the time table is not primarily responsible for the success in either case.

I suggest that in the case of the Swedish schools this integration is the result of three things:

1. First, there is less of a tradition than here to the effect that preclinical work alone is scientific and that clinical work is merely vocational and practical.

2. The relative absence of such a tradition is due to the fact that clinical work in the wards of Swedish teaching hospitals is essentially widely based on the application of clinical science.

3. This is largely due to the fact that the pattern of staffing of the hospitals and medical schools (and the terms and conditions of service of clinical teachers particularly) are suchas to allow and encourage research. The majority of clinicians enjoy the advantage of being geographically full-time in the teaching hospital, whilst also enjoying the advantages of private and domiciliary practice. They are able to combine research with clinical work in a wide field, and also have time in which to give their undivided attention to education. That this pattern of staffing is not static but is adapted to meet changes in medicine is shown, I think, by the establishment of departments in Clinical Physiology. Time may reveal weaknesses in this innovation, but at the moment it seems to provide one answer to a multiple problem—that of spreading facilities for clinical science economically through the hospital, that of maintaining and raising the standard of scientific work, and that of training men for research in current times.

The net result of this pattern of staffing seems to me to be integration of teachers and, from the point of view of the student, I think this is much more important than any time-table integration of his studies. In the final analysis what matters is that the student is able to integrate his work for himself. He can be helped to do this if his studies on a particular aspect of Medicine are brought together in time, but if he is taught by a series of teachers who remain isolated from one another, very much of the value of synchronization must be lost. From visits to Western Reserve I am of the opinion that it is a most successful school and that this success is more dependent on the remarkable degree of mutual cooperation and consideration between the staff than it is upon the time table. Much of this same integration at staff level is to be found in Sweden and makes the present extensive use of clinical pathological conferences and like methods of interdepartmental teaching both possible and profitable.

But an education in Medicine, however well it avoids creating a separation between science and practice, is of no use unless the student is also very well trained in clinical methods and also properly prepared as a professional person. To my mind one of the best features of the Swedish curriculum is that it provides time in which the student can practice his clinical technique. He has time in which to grow in

Medicine, to become clinically more skilful. This increasing skill brings experience, and his knowledge and experience can grow together in harmony. This, I would think, should make the student well able to gain the greatest value from responsible practice under supervision in his final year.

This last year seems at first sight to resemble our year of provisional registration appointments, but the differences are, I think, important. There is provision for 2 months' assistantship in a clinical subject of the student's own choice, and this, I think, is good. Second, the assistantships in Medicine and Surgery which are frequently held in nonteaching hospitals, almost invariably are followed by several years of hospital appointments. One should add, perhaps, that medical students in Sweden complete much of their military service bit by bit in their University holidays.

However, when, as we must, we include our preregistration year in the total undergraduate training, then our curriculum is the same length as the Swedish. But again there is an important difference: The Swedish 6-year course is a minimum, whereas our tends to be regarded more and more as a maximum.

It seems to be generally accepted in Sweden by all concerned that most students will take 7 years, just as previously many took 9 or 10 instead of the minimum of 8. I think we must all agree that students do differ much from one another, and it seems illogical and educationally unsound that they should be expected all to cover the same ground at the same speed. It is surely an excellent thing that a student should be able to leave the routine course at a point which suits him individually and either repeat an appointment or spend a year in a particular department. No one can doubt that we would be very wise to increase the number of students who spend a year on a course for a B.Sc. after Second M.B.—and it would be even better if students with different interests or slower maturation could leave the main stream for a year of similar work at later stages. To do this we would have, first, to overcome the novelty of the idea, second, to struggle for the acceptance of it by grant-giving bodies, and third, to have sufficiently close knowledge of the individual students to be able to plead on their behalf with real assurance. Perhaps it is as well to remind ourselves that such a scheme is no idealistic concept but a working reality in two countries, Sweden and America, where medical education is far more expensive to the individual student than it is here. We could think of it as a concrete plan for improvement

The curriculum as a guide to the student.—There is also another thing which attracts me about this curriculum. It is clear and, I think, logical. Its different stages are obvious.

The study of the normal

A year of introductory study, including Pathology and clinical method

10 months in the wards, practicing clinical method and acquiring general experience, with a brief experience also of what might be called therapeutic "specialties" such as thoracic surgery and radiotherapy

16 months in anatomical specialties and pediatrics and

9 months of practice under supervision.

It does seem important to me that a curriculum should consist of a series of progressive stages of learning, and that these should be clearly defined. It can then be a guide to the student. Some time tables in this country seem to be more like the directions for one of those treasure hunts where the competitor has to collect a series of unusual articles in a given period of time. I sometimes think that the stream of lectures spreading through the curriculum, which it is now fashionable to decry, at least offer the student some guide as to what he is supposed to be learning, even if their content is not always very valuable.

Here is another concrete plan—give the student a meaningful timetable to guide him through his studies.

Such are my reactions to the Swedish curriculum as far as the arrangement of

studies and its duration are concerned. I was at first tempted to comment that in a country where the curriculum for all schools is ordained by a central office, it seemed a pity that some kind of controlled experiment had not been carried out by putting one curriculum into force in two of the schools and a different one in the other two. Then I realized that Professor Rexed might point out that in London University there are twelve schools with twelve different curricula, that the students of all of them sit the same external final examinations, and that so far we have not made much use of that experiment.

However, I have implied that a time table does not give any complete indication of the nature of teaching in a particular school, and it is, of course, also true that it does not reveal everything about the nature of learning. This curriculum nevertheless does indicate that in Sweden it is accepted that the student has a mind of his own and that he should be able to vary the curriculum somewhat to suit himself. That he is encouraged to use his own mind is also shown by the fact that he is able and encouraged to undertake research projects.

In our medical schools the idea of making students eager to learn by stimulating their curiosity never seems to have found much favor. Indeed I think many teachers regard the research endeavors so common among American and Swedish students with positive disfavor if not distaste. I am sure that little of this work actually pushes forward the frontiers of knowledge, and perhaps it should not be called research. I am reminded of a student in Stockholm who ended a conversation in which he was describing his current clinical appointment with the words "And now I must go, I wish to make science in the Department of Physiology." The literal translation of the Swedish word for research is "for looking" and maybe he did not want to lay claim to such heights of endeavor. However, it was clear that he enjoyed making science, and I think many students, American, Swedish and English, welcome the chance of tackling in depth some problem of their own choosing, and benefit from it. Furthermore, it helps them in their pursuit of that elixir of medical education, the much sought after integration—especially when, as so often is the case, their research takes them back to a basic science department. A still further advantage derives from the fact that the student often discovers for himself someone to work under, or rather work with, whose mind and method of thought attract him. In this manner a highly successful form of academic tutoring is established.

Here is another concrete plan—encouragement of curiosity by research.

In the latter part of the curriculum it is obvious that responsibility to patients can act as a stimulus to study. Beyond this one further indication is given by this curriculum as to the incentives which entice the Swedish student onward. Again I think it is an incentive which is made better use of there than here. This is the examination system. Obviously, the nature of the examinations themselves does not particularly encourage the acquisition of factual data, and does place great importance on the standard of work performed during the course—but at this distance we cannot say more than that. On the other hand, the timing of the examinations can be judged on the evidence before us. Not only can each student select the time of his finals, but he is provided by earlier examinations with a reasonable indication of his progress throughout the 6 years. One of the greatest weaknesses of our present system is that no assessment of progress which can be used by student or teacher is made during much of the clinical period, and the unfortunate student is confronted with a positive marathon at the end. In this way much of the educational value of examinations is lost.

Here is another concrete plan—assessment of knowledge, quality, and ability by stages instead of our present examination system.

Those points about the student are shown by the curriculum. But just as a railway

timetable does not indicate the state of cleanliness of the railway carriages, so the curriculum fails to indicate the atmosphere of learning in a medical school. From my own observations I would like to comment on the atmosphere in the Swedish schools.

It is difficult to describe, but I think it is to be found in every medical school in which the problems of medical education are being tackled by action. It does not seem to matter very much what the action is, or whether everybody agrees with it, but it seems to create an atmosphere of liveliness. All the teachers, and even the Dean, seem to know what is going on and have an awareness of the course as a whole. It is accepted that education matters, and even if no one has any answers to its problems, it seems worth while to try to find out. The interest in education is communal and takes precedence over an interest in teaching, irrespective of whether that is naked and unashamed or merely quietly vested. Students are important as individuals. Perhaps there is something stimulating in the sense of being committed to the struggle, which contrasts very favorably with the despondency which grows in those schools where active education of individuals is held in abeyance pending some recasting of the timetable of teaching.

These different atmospheres are very easily transmitted from staff to students. We must, however, also ask ourselves whether perhaps something of the atmosphere in Swedish schools is due to the fact that students do not receive grants from the State, but only loans.

Thus, my comments on Swedish medical education are comparatively enthusiastic, and perhaps they are conditioned by the fact that in Sweden the very best students wish to take up medicine.

In general, the arrangement of studies seems sensible, their duration seems sensible also, and the incentives given to students seem to me to be wisely deployed. The schools seem happy, and one feels the standard of education is high. Yet, I think that this success really depends not on the curriculum, but on the attitude of the teachers toward education. And this, I think, depends itself upon the simple fact that they are able to spend a reasonable proportion of their time in giving their undivided attention to it.

This, I think, is one very important point which has been raised by today's comparative study of curricula. We *must* find some method whereby in this country we can give more time to education in medical schools.

This seems to me to be one of the most important problems with which we are confronted, and a solution to it will enable us to make more progress than will any new curriculum. Indeed, the obstacle in many schools to devising a better curriculum frequently lies in teachers' having insufficient time to devote to education.

If it were fully realized that this time is necessary then I am sure it would not be too difficult, with good cooperation between University Licensing Bodies and the Ministry of Health, to find a means of providing it. Indeed, slow progress is already being made. It is, however, essential, in my opinion, that whatever arrangements are devised they should fit naturally into the British pattern of staffing. There is a fundamental difference between our pattern and that of Swedish and American schools, and although it is not revealed by the curricula, it has a profound effect on medical education.

In Sweden, in America, and, indeed, in most countries, there is a pyramidal system of control of hospital patients. Beds and clinics are grouped into a few large services, for each of which one man is responsible. This is in marked contrast with our own systems of many relatively small independent units, a system which results from the fact that each member of the Consultant Staff has his own beds and clinics. From this is derived our system of teaching firms, in the possession of which we differ from the majority of other countries. I believe that this traditional feature of British medical education has been the source of its

greatest strength in the past. I think the firm has proved to be one of the best teaching units yet devised.

It has provided a most satisfactory means whereby clinical method can be practiced repeatedly and continuously for long periods, with a reasonable degree of supervision from experienced teachers and with the stimulus of responsibility to patients.

As the direct descendant of apprenticeship it has insured the maintenance of the virtues of apprenticeship, and it is potentially capable of providing guidance to the individual student in his learning.

It should provide a natural method whereby a scientific method of thought can be inculcated in each student, and it should make easy his understanding of the patient as a whole and his awareness of the relationship of medicine to the community. It could even be possible for a firm to extend its activities outside the hospital into the community.

More important than all these the firm can make it comparatively easy for each student to learn that the care of the individual patient must take priority over everything else, and that it is the yardstick by which all things in medicine are measured.

Good though I believe the Swedish system of medical education to be, I think it would be better still if it were based on this method of teaching. I do not suggest that the full potential of the method is realized in Britain now. Many things have, I think, combined to weaken its efficiency in regard to functions it once performed so well, and to prevent the realization of its potential as a means of teaching scientific medicine. Some of the factors concerned are the result of the advances of medicine which have led to specialization, but the greatest single factor is that the Chiefs of firms are deprived of the time required to give undivided attention to teaching, and often of the time for research, and often of the time and opportunity to collaborate with their colleagues in the preclinical and clinical science departments.

I believe it is a deep faith in the rightness and importance of this traditional British form of teaching which makes many people suspicious of new ideas in medical education, for they assume that new ideas mean entirely new methods. Great progress will, I think, be made by adaptation and reinforcement of this old method and by thus carrying on our tradition into the context of modern medicine. It is, however, unfortunate that in many schools some of the most vocal advocates of our traditional system of training are to be found among those very clinicians who are in fact tending to undermine it by their inability to meet the great demands it makes on them in modern times.

One would like to think that this Association might do something, perhaps by joining in comparative studies with other countries, to establish the value and the essence of the firm system. If the assumptions I have made are shown to be correct, this evidence would surely help to secure for the system that which it most needs, time for teachers to give more attention to it.

Perhaps today's meeting has itself done something in this regard, for I think it is significant that one of the most radical innovations into the American scene was described to us today by Dr. Hale Ham when he spoke of the Continuity Clinic at Western Reserve. It seems to me that this Clinic is in fact a series of out-patient firms—each run by one member of the Staff for a very few students and selected patients, each firm being capable of providing that long-term continuity of care for both patient and student which is now so obviously desirable.

Is this perhaps yet another concrete plan for improvement and one which could be put into effect in Sweden as well as Britain?

It has not been my intention to be facetious about the desire for concrete plans. I have wanted to draw attention to what I believe to have been one of the most important contributions made to this Conference. It was made yesterday by Mr. Northfield, who appealed for the addition of clearly defined plans for improving medical edu-

cation, to criticism of its present condition. He allows the principle that diagnosis should precede treatment, and does not oppose diagnosis of the illness of education. His is the view of a good teacher who wants education to be good and become better still. It expresses most honestly a reluctance to accept change without good evidence for its necessity and value.

In effect he says—prove what is wrong and prove that change will not make things worse.

This is the challenge to A.S.M.E. and a very right and proper challenge. The demand is for concrete plans, but we must remember that concrete is rigid and takes a lot of breaking up if it is cast in the wrong shape, and after all it consists of but little cement, not much sand and such a lot of ballast.

MEDICAL EDUCATION FORUM

Editorial

WE WISH THEM WELL

The expanding program of the Association of American Medical Colleges has been assisted by several philanthropic trusts. The representatives of two of these groups have retired, but, fortunately, will continue an association with medical education and the A.A.M.C. We would like to express appreciation for their support of medical education and wish them well in their future activities.

The retirement of Harold H. Loucks, M.D., recalls the outstanding contributions the China Medical Board has made to the program of the A.A.M.C. Perhaps the greatest of these was the decision to share with the Sloan Foundation the cost of our new headquarters building—a lasting monument. Free subscriptions to the *Journal* for any foreign medical school have also been financed by the China Medical Board, as have various A.A.M.C.-sponsored conferences.

By his wisdom and humility, Harold Loucks has made an impact on medical education that far transcends material gain.

The background which he brought to the China Medical Board when he joined the Staff in 1946 was unique and interwoven with the development of the Peking Union Medical College, which was in its day the finest medical school (faculty and facility) in the world. A medical school in Peking was purchased by the Rockefeller Foundation in 1915 as a central development in an effort to up-grade medical education in China. No stone was left unturned to make it an outstanding institution. Loucks joined the staff in 1922 as an Assistant Surgical Resident and became Professor and Head of the Department of Surgery in 1930. He was interned during the early days of World War II but, after repatriation, worked as military surgeon at Chungking. In 1946, Dr. Loucks returned to P.U.M.C. to lead the rehabilitation of the school which has been stripped during the war. He left Peking as the Communists moved through China and has served as Director, China Medical Board, since 1954.

Since the seizure of Peking, Dr. Loucks has directed a program that has supported fellowships, visiting professorships, books, journals, and equipment for medical and nursing schools in the Far East. It was my good fortune to be associated with him briefly during one of his journeys to the Far East, and the esteem in which he was held by medical educators in Japan was solid evidence of his stature. The unusual warmth of his human relationships made him particularly effective. It must be a great satisfaction to him to see the remarkable progress of Japanese medical education since World War II.

His retirement will be marked with regret in the Occident and the Orient. We are particularly conscious of the contribution of the Board to the A.A.M.C. during his dis-

tinguished directorship and are pleased that he will continue an association with C.M.B.

On November 1, 1959, Dr. Lester J. Evans assumed the Directorship of the Center for Rehabilitation Services at New York University. We know that Lester will not desert his old friends in the medical schools and yet we wish to cite his contributions to medical education during his association with the Commonwealth Fund. The word "contribution" in Dr. Evans' case goes far beyond the money that was made available to the A.A.M.C. and to many medical schools by the Fund. We are all grateful for the cash—but here let us look at some other contributions from the Evans' purse.

Perhaps his first big contribution to medical education was through the pioneering development of educational programs in rural hospitals. This program we can now see as the real forerunner of today's numerous formal programs of medical education in private hospitals. How many of us, meeting the urbane Dr. Evans in New York's University Club, would be reminded of his leadership in advancing rural medicine.

The concept of "comprehensive medicine" was envisaged and then applied through the encouragement of Evans. The acceptance of Comprehensive Care Clinics across the country indicates the validity of this thesis.

Lester Evans' fertile mind has contributed much to the A.A.M.C. His participation in the development of the Teaching Institutes and the research program has been invaluable.

Above all, Lester Evans put across "research in medical education"—a development that has helped immeasurably in increasing the international stature of U.S. medical education.

His deep conviction on the important role of the University in medical education should make his work on the campus of N.Y.U. a pleasant challenge. We suspect that before long he will be pushing rehabilitation in medical education. Lester Evans would probably note that medical education should be under constant rehabilitation, and we are grateful for his emphasis on this in the past—and in the future.

JOHN Z. BOWERS, M.D.
Editor-in-chief

Datagrams*

EXPENDITURES FOR MEDICAL-SCHOOL FACILITIES AND EQUIPMENT OVER THE LAST TEN YEARS

(Millions $)

Type of Facility	Expenditures Not Involving Matching Funds	Expenditures Involving Federal Matching Funds	Total Expenditure for Construction
Educational and Research	222.7	318.4 (80.6)*	541.1
Medical-School-owned Hospitals	112.9	127.6 (34.1)*	240.5
Affiliated Hospitals	340.6	467.9 (94.0)*	808.5
Institutions Other than Hospitals Used for Teaching and Research†	10.7	32.8 (9.6)*	43.5
Total	686.9	946.7‡ (218.3)*	1,633.6

* (Federal funds involved).

† Many of these institutions are not owned and operated by the medical school (i.e., research centers, health departments, etc.).

‡ Note for every $1 of federal funds, private, state, and university sources have expended $4!

The total expenditures since 1948 of all United States medical schools (including Puerto Rico) and their affiliated institutions have been tabulated above according to the type of facility and with reference to federal matching funds. The tabulation includes expenditures reported for construction even though not yet completed but does *not* include committed funds where construction work has not been started.

The total sum expended since 1948 by all schools and for all types of construction was well over one and a half billion dollars. Almost $782,000,000 of this amount was allocated to educational and research facilities and to university-owned hospitals, of which only $114,852,000, or about one-sixth, was secured from federal matching funds. This means that over the ten-year period the United States medical schools have financed through their own effort over a half-billion dollars' ($666,718,000) worth of construction exclusive of affiliated hospitals and other non-hospital teaching institutions. A large proportion of the sum—approximately 25 per cent—was raised by ten schools which were either newly developed during the period or were building new plants.

NOTE.—The construction figures reported here are not comparable to those previously reported in the Datagram published in the July issue of the *Journal of Medical Education*. The earlier preliminary figures related to 78 fully developed four-year U.S. schools. The expenditures shown in the preceding table relate to all U.S. medical schools, including the two-year schools and the new four-year schools now in operation or under construction. Also further analysis of the data has shown that in a few cases there was duplication by several medical schools in reporting expenditures for affiliated hospitals and other non-hospital teaching institutions. In the present tabulation all duplications have been eliminated.

* Submitted by the Division of Operational Studies of the AAMC. Source of information will be furnished on request.

EXPENDITURES FOR CONSTRUCTION OF UNITED STATES MEDICAL SCHOOLS AND THEIR AFFILIATED INSTITUTIONS SINCE 1948 BY TYPE OF SUPPORT

(Millions $)

TYPE OF MEDICAL FACILITY	PUBLIC			PRIVATE		
	Expenditures Not Involving Federal Funds	Expenditures Involving Federal Funds	Total	Expenditures Not Involving Federal Funds	Expenditures Involving Federal Funds	Total
Educational and Research	155.2	169.3 (32.9)*	324.5	67.5	149.1 (47.8)*	216.6
Medical-School-owned and -operated Hospitals	71.2	87.4 (26.6)*	158.6	41.7	40.1 (7.6)*	81.8
Affiliated Hospitals	63.6	183.5 (39.2)*	247.1	276.9	284.4 (54.7)*	561.3
Institutions Other than Hospitals Used for Teaching and Research	2.8	7.4 (2.5)*	10.2	7.9	25.4 (7.0)*	33.3
Total†	292.8	447.6 (101.2)*	740.4	394.1	499.0 (117.1)*	893.1

* (Federal funds) † Details may not add to totals because of rounding

The distribution to private and public schools of expenditures for construction of United States medical schools and their affiliated institutions since 1948 is shown in the table above. The sources of federal funds are tabulated below.

FEDERAL GRANTS FOR MEDICAL SCHOOLS AND THEIR AFFILIATED INSTITUTIONS SINCE 1948 BY SOURCE

(Millions $)

Type of Facility	Hill-Burton	Research Facilities	Cancer and Heart Research	Total
Educational and Research	2.0	68.4	10.2	80.6
Medical-School-owned Hospitals	32.1	1.0	1.0	34.1
Affiliated Hospitals	72.1	14.2	7.7	94.0
Institutions Other than Hospitals Used for Teaching and Research	6.9	1.9	.8	9.6
Total	113.1	85.5	19.7	218.3

Communications

LIAISON BETWEEN PREMEDICAL ADVISERS AND MEDICAL COLLEGE ADMISSION COMMITTEES

GEORGE A. WOLF, JR., M.D.*

In order to improve communications between the teachers who are the premedical advisers of students entering the University of Vermont College of Medicine and teachers who are on the Admissions Committee of the College of Medicine, a one-day meeting was planned at the University of Vermont College of Medicine.

Representatives from the premedical advisory groups of 27 New England Colleges attended from the 37 colleges which were included in the invitation list.

The program consisted of a few introductory remarks, a 20-minute paper on "Admissions from the Standpoint of the College of Medicine" by a member of the Admissions Committee of the College of Medicine and a 20-minute paper on "Admissions from the Standpoint of the Undergraduate College" by the Chairman of the Premedical Advisory Committee of the University of Vermont.

There followed an hour general question-and-answer period concerning admission policies of the University of Vermont College of Medicine. No attempt was made to describe our college, but questions were answered as they applied locally or in some instances nationally.

An informal luncheon was followed by small group discussions which covered the following topics:

1. Criteria for evaluation of students for recommendation by premedical advisers.
2. Criteria for selection of students by medical schools.
3. The premedical curriculum from the standpoint of the medical schools and from the standpoint of the undergraduate colleges.
4. The premedical advisers and their functions.

The moderator of each discussion group was a member of the Admissions Committee, and the recorder was a member of the University of Vermont Premedical Advisory Committee.

Final summaries of the group discussions were given at the end of the program.

Inasmuch as the majority of those attending felt the meeting was of unusual interest, it was thought that a brief description of the material covered would be of use, particularly to the premedical advisers in the local area who were unable to attend the meeting and possibly to premedical advisers elsewhere in the country.

SUMMARY OF THE CONFERENCE

Objectives of medical schools.—It was agreed that most medical schools in this country desire to provide a superior general medical education which will permit the student to be qualified to obtain further training in the area of his interest, whether this be general prac-

* Dean, College of Medicine, University of Vermont.

tice, clinical specialties, medical administration, teaching and research, public health, and so forth.

It was pointed out that some schools have the major objective of preparing students for the pursuit of teaching and research careers. Clearly, no medical school intended to prepare the student for any particular kind of practice. In all areas, further training in hospital internships or residencies, graduate schools of public health or research and teaching programs is required.

Admissions from the standpoint of a College of Medicine.—Medical college admission committees usually consider students with the following in mind:

1. Grades: It was stressed that the actual reported grade varies in significance from college to college and course to course. Thus, any attempt to mention a "cut-off grade" is almost meaningless. Usually, students with averages below 80 are not considered, although it is recognized that a 75 in some colleges may be equivalent to an 85 in others.

Although the Admissions Committee generally looks with disfavor upon a failure in any course, members are especially interested in the grades in courses which are required for admission to this school, i.e., English, 1 year; college level mathematics, 1 year; general chemistry, 1 year; organic chemistry, 1 year; quantitative analysis or physical chemistry with laboratory, ½-1 year; biology, 1 year; physics, 1 year.

The faculty of this college has been concerned with the poor command of written and oral English possessed by some of the candidates, and as a result has required certain students to take English tests. The requirement of such a test is being considered as one of the prerequisites for admission.

In addition, the faculty has been concerned with the lack of ability on the part of some students to demonstrate competence in quantitative areas and has thus recently required students to have mathematics at the college level rather than college courses which essentially review the high school experience in mathematics.

Grades in the chemistry and physics courses are scrutinized with some care, because many of our students have difficulties with physiology and biochemistry.

In general, the Admissions Committee feels that grades are the most acceptable criterion, although obviously not the best.

Students from good undergraduate colleges with marks above 80 usually have no trouble in medical school.

It is helpful to have the class standing of an individual student as well as his grades.

A progressive increase in the quality of grades during a student's career in college is considered a good sign.

Sporadic performance with mixtures of high and low grades is viewed with question. A descending grade level is felt to be serious. This Committee deals harshly with those whose grades fall off markedly following admission to medical school. Therefore, all admissions prior to completion of the senior year are provisional.

2. The Medical College Admission Test: The Medical College Admission Test is another one of the facets of a student's performance considered by the Admission Committee. No cut-off point is used. However, if students have good grades and low aptitude scores, they may be scrutinized very critically before being accepted. Similarly, those with high aptitude scores and low grades are scrutinized, but this is not considered to be as serious as the opposite pattern. Low marks in the quantitative and science areas cause some concern, but in general the usefulness of the test, in our experience, is limited to its consideration in the light of other facets of the student's performance.

The problem of distribution of the Medical College Admission Test scores to undergraduate instructors was discussed. The majority of those present from the undergraduate colleges felt this would be helpful. It was pointed out that there are certain values inherent upon not releasing these test scores to undergraduate colleges. It would indeed be unfortunate if undergraduate faculty members had such scores available and used them to either encourage or discourage students from going into medicine.

3. The Personal Interview: It has been shown repeatedly that the personal interview does not permit one to predict the academic performance of the student in medical college. However, at this College of Medicine, the faculty feel they would like to interview all students before admitting them. It is doubtful, in our experience, that anyone has ever been turned down on the basis of the interview alone. However, many of the committee members feel more comfortable personally about accepting students with low grades if the interview is favorable.

The committee recognizes we are dealing with people and attempts to use all methods to judge students rather than only presumably objective methods.

4. The Health Record: The health record is reviewed carefully. The Committee wishes to be assured that the student has no diseases or incapacities which will interfere with the satisfactory completion of his medical college training and his later productivity as a physician. For example, does his disability permit him to climb the stairs in our building? Is the prognosis of the illness such that he may not be able to practice medicine or contribute to the profession for a significant period of time? Will his disability prevent him from performing effectively and safely after he has completed his training? Will harm result to the individual concerned if he embarks upon the rigors of a medical course?

The committee looks especially for evidences of emotional illness, recognizing the responsibility of the College of Medicine within the limits of its ability to graduate those who are stable enough to be entrusted with the responsibility for human life.

5. Recommendations: It was agreed that this was probably the most important area in the matter of selection of medical students. It was further agreed that little consistency and objectivity is involved.

From the standpoint of the medical school, the personal acquaintance of medical school authorities or admission committee members with the college teacher sponsor is highly desirable. Personal acquaintance of the medical school personnel with members of a premedical advisory committee is still more desirable.

The medical school occasionally gets the impression that one or more people in a given college establish themselves as "hatchet men" or self-styled judges and lead the students to believe that a good recommendation from these men will get them into medical school. On the other hand, there are other devoted teachers who attempt to provide for the medical schools as unemotional an evaluation as possible of a given student.

In general, the committee approach to recommending is very satisfactory, particularly if a summary of the committee's deliberations is presented along with excerpts from individual comments.

One negative letter from an individual faculty member may result in the student's being kept out of medical school, whereas a committee report with one minority opinion expressed and commented on by the chairman of the committee is usually very helpful and frequently does not result in the student's being rejected.

The Admissions Committee does not expect the Premedical Advisory Committee to make decisions for them, but the opinions of a group of men called together with the

express purpose of recording their opinions about the suitability of a given candidate for the study of medicine is most helpful.

Standardizing forms used for recommendation of students for the study of medicine was suggested.

Again, it is helpful to us if the Premedical Advisory Committee ranks their applicants in order.

The matter of appearance and personality is, of course, difficult to evaluate. It was pointed out that the choice of a physician is a highly personal matter and that members of a premedical advisory committee should not consider the appearance and personality in terms of their picture of the ideal physician. This picture may vary greatly with individuals and social groups. It is more the responsibility of the Premedical Advisory Committee to concern themselves with academic ability, demonstrated interests on the part of the students, the scholarly or professional attitude, intellectual honesty, integrity, and the like.

Admissions from the standpoint of the undergraduate college.—Time of notification of acceptance of students to medical college. The well recognized problem of students who neglect everything else while waiting for acceptances for medical college was discussed. It was admitted that the emphasis placed on this was bad and that the student's view of acceptance to medical school as clearing a hurdle was unsatisfactory.

From the standpoint of medical schools, competition for superior students is great, and a good deal of difficulty has been experienced in attempting to get agreement among colleges as to a suitable date for acceptance. Harvard, Vermont, and some of the other eastern medical schools have agreed to send out notices on three occasions only prior to January 1 and these on given, agreed-upon dates.

Early acceptances to medical school, i.e., during the junior year, are frowned upon by the Association of American Medical Colleges because they permit some schools to pressure students into acceptances before they make up their minds completely.

It was agreed that a matching plan would be the most effective solution, but this seemed to be some years in the future. In this regard, all medical colleges in the United States have agreed not to accept students prior to 12 months from the date of admission.

It was suggested that students interested in medicine might take the Graduate Record Examination at the end of their sophomore year. This would given them some experience in this type of examination and also give them another index of their abilities and potentiality for graduate work either in medicine or elsewhere.

A student adviser system in which faculty members of the undergraduate college cognizant of the problems of admission to medical school are assigned to individual students was considered to be a good plan.

The question of the premedical student's major was discussed at some length. The notion was expressed that medical schools are looking away from science majors. An attempt was made to clarify this misunderstanding. Nearly all medical schools feel that the potential medical student needs a liberal education because medicine is broadening all the time and because the doctor must assume a suitable position in his community. Thus most schools require premedical experience in a liberal arts college. Medical schools in general object to students taking science courses simply because they believe they will have an easier time in medical school. For example, if a student takes histology in college because he thinks histology in medical school will be easier, not only is he wrong, but we are not interested in students who take college courses simply to help them get through medical school. The

same applies to chemistry courses, and we have no particular interest in students who have had courses in biochemistry, because we teach biochemistry in the medical school. However, there is a crying need in the medical profession for people who are better grounded in the natural sciences. The newer research programs require a much broader background than we are able to provide in most medical schools. Therefore, chemistry majors and physics majors are most desirable applicants for medical school. On the other hand, we are not inclined to reject a student because he has majored in other than a science.

A high quality student will be able to make a contribution to the medical profession regardless of his major. However, the medical college curriculum presupposes knowledge in the areas of chemistry, physics, and biology and in general starts where the undergraduate required courses leave off.

Occasionally, students will be found who are deeply interested in the sciences and highly motivated for medicine. In spite of this, these students occasionally may have difficulty with science courses. It would be reasonable to urge them to take more than the usual amount of science under these circumstances.

In general, medical schools are attempting to reduce the number of required courses to a minimum in order to allow the student to delve more deeply into the areas of his interest.

It was agreed that there is no ideal curriculum for premedical students. In general, the undergraduate premedical advisers felt that they needed to know more about medical college activities and welcomed this meeting. Consideration was given to the role of the premedical advisers in directing a student toward or away from medicine. The student should have the opportunity of talking to more than one adviser. Attempts to fit a student into a given speciality at this time in his career should be avoided. Many students change their minds about their future careers in medicine during their third and fourth year in medical school.

Many advisers are very helpful in orienting the student so that rejection by the medical school is not necessarily a negative act.

Attention was called to the great need for personnel in the so-called para-medical areas such as nursing, hospital administration, public health work, physical therapy, social service, and so forth. Many students do not know about these areas and indeed might prefer them to the long, rigorous medical course, if they knew about them. It was agreed that advisers should consider the students in this light and not simply confine their concern to whether or not a student can be admitted to medical school.

The premedical advisers expressed appreciation of those schools which provided them with follow-up reports of the performance of their students. These reports are more meaningful in the schools where there are premedical advisory committees, in that all advisers see them.

The premedical advisers should attempt to learn about differences in the various medical schools in the country.

It was indicated that many medical schools have very similar objectives except that a few admittedly are concerned only with the production of teachers and investigators. Schools vary in their ability to achieve their objectives, and although highly satisfactory medical education can be obtained in all medical schools of this country, rather detailed familiarity with the individual programs is necessary to judge the various schools in this regard. Furthermore, some schools are better suited to certain students than are others. In general, there are no "best" schools for all purposes.

THE USE OF PSYCHIATRIC AND PSYCHOLOGICAL CONSULTATION BY THE ADMISSIONS COMMITTEE AND PROMOTION BOARD OF THE UNIVERSITY OF MICHIGAN MEDICAL SCHOOL

THORNTON WOODWARD ZEIGLER, PH.D.*

At the recent meeting in Ann Arbor of the Midwest Conference of Deans and Admission Officers of the Association of American Medical Colleges, some interest was expressed in the program of psychological and psychiatric examinations which we at Michigan have had in effect for some 20 years. Accordingly, although we have published two previous notes on this[1, 2] it was felt that it might be worth-while to place a note in *The Journal of Medical Education*, since in this way it would be brought directly before Medical School personnel.

When the author became affiliated with the University of Michigan Medical School in 1939, Dr. Raymond W. Waggoner, Chairman of the Department of Psychiatry, had already started an informal medical student counseling service in connection with the Office of the Dean, at that time Dr. A. C. Furstenberg. This program was extended and enlarged within the next few years, and while it has varied in some details, both in referral policies and in the specific examinations given, it has remained in essence unchanged. The program is a twofold one. The greater part is advisory to the Promotion Board and is directed toward the salvage of students who are showing academic difficulty in the Medical School; while a lesser part, in cooperation with the Admissions Committee, is designed to assist in evaluating those candidates for admission whose presented material does not fall clearly in either the "to be rejected" or "to be accepted" class.

We are happy to see that as the years have passed we have been asked by the Dean's Office and Admissions Committee to see students who are not in academic difficulty but who have instead some personality problem. Even better, a few students are self-referred each year. It is well accepted by the faculty that grades are only a partial indication of the student's success or failure. One question still concerns us, however, namely, whether we are merely helping medical students to graduate or whether, we hope, we are adding to the number of competent, well adjusted physicians. Feedback suggests that we are having some success in the latter.

The program is set up in this way. The student, regardless of by whom or for what reason referred, is first seen by a member of the senior psychiatric staff and is interviewed and evaluated by him. If the results of this interview leave no doubt as to proper procedure, the psychiatrist reports by letter to the person by whom this student was referred and advises the student as well. This letter is kept on the student's medical school record. A detailed confidential record is kept in the Department of Psychiatry and is not accessible to the Medical School. In the case of the self-referred student, no letter goes to the medical school.

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[1] T. W. Zeigler and R. W. Waggoner, Psychiatric Factors in Medical Students who Fail. Am. J. Psychiat., 103:369–76, 1946.

[2] R. G. Lovell, Admissions Procedure for Students Applying to the University of Michigan Medical School. J. Mich. St. Med. Soc. pp. 1125–1133 (August, 1958).

If, on the other hand, the psychiatrist wishes more or different information than he has obtained by interview, he may refer the student for psychological testing. In this case a senior member of the clinical psychological staff of the Department of Psychiatry will undertake to administer a battery of psychological tests. These tests are not thought of as part of an aptitude battery but rather as part of a diagnostic psychological study. With a few additions they comprise the test battery we would give a psychiatric patient. In general they would be as follows: An individual test of general intelligence, usually one of the Wechsler series, is given in order to determine how intelligent the student is, but, what is even more important, so that it may be determined how efficiently he can operate in this stressful situation. The results of this test are analyzed in terms of ability to use abstract reasoning and judgment, general information, rote memory, etc. A major projective test, usually the Rorschach, is given and sometimes Thematic Apperception Test cards will be used. In addition, other tests such as sentence completion, Bender Gestalt, and figure drawing tests are included. Through this test battery we get some indication of emotional stability or instability, and unfortunately we sometimes find evidence of psychosis. Further studies inventory the student's study habits and speed and accuracy in reading. Incidentally, in our subjects these latter two do not necessarily vary together as theory would suggest.

When the psychologist has completed his work-up he writes two reports which he sends to the referring psychiatrist. One is a detailed and intimate account setting forth his findings on the tests and his conclusions about the student's capacity, preparation, mental and emotional stability, dynamics, defenses, and diagnosis, if any. He would also include any historical data which may have been given in confidence. This report will be added to the confidential record mentioned earlier. The second report is one giving only general information about the student and about the conclusions reached by the psychologist. This will become part of the student's Medical School file.

On the basis of these psychological reports and his own observations in his original interview and any subsequent interviews he may have had with the student, the Psychiatrist makes a written report to the Medical School. In this report he makes whatever recommendations he feels to be in order. These may, of course, run the gamut from recommendation to drop or not admit the student to advice that he be admitted or readmitted if he has been dropped. He will, of course, feel free to make to the student whatever suggestions he feels are appropriate. Referrals for psychiatric treatment often are made at this time. With this new material added to the student's or applicant's record the appropriate Medical school officer or committee may now consider the student's record and make an official decision regarding it. This final decision is never made in Psychology or in Psychiatry.

It should be borne in mind that this procedure is not suggested as a means of admitting students. The present admission policies at Michigan are, in fact, not too bad; this year we graduated 186 students of an original class of 200. The program is useful only in evaluating the exceptional student who performs in a way different from that which we would expect from the original material available at admission or in admitting students whose supporting material raises rather than answers questions. We have found that the use of these examinations has been helpful in both the admission and salvage activities of the Medical School.

ABSTRACTS FROM THE WORLD OF MEDICAL EDUCATION

ANGELA SANCHEZ-BARBUDO, PH.D.
Abstract Editor

British Orthopaedics. NORMAN CAPENER, M.D. The Lancet, Vol. 1, pp. 951–53 (May 9), London, 1959.

In his presidential address to the British Orthopaedic Association, April 30, 1959, Dr. Capener (orthopedic surgeon to the Princess Elizabeth Orthopaedic Hospital, Exeter) reviews briefly the history of British orthopedics as a surgical art, recalling the milestones set by pioneers in the field (such as, for instance, Robert Jones and G. R. Girdlestone who, after World War I, worked out a plan for the nation-wide organization of orthopedic services). This work was facilitated by national legislation (notably the Education Acts of the early 1920's) and also by private philanthropy (e.g., Lord Nuffield's special fund for orthopedic development). Country orthopedic hospitals were built having peripheral outpatient clinics where the consultative work of visiting surgeons made possible the diagnosis of incipient or established disability, its effective treatment, and the supervision of patients before or after treatment in the central hospital. Such clinics, Dr. Capener points out, have proved to exert an educative influence of considerable social and medical consequence, as a link between the central hospital and the local medical practitioners and public health authorities. The basic ideas underlying this system included the segregation of patients in units designed for the purpose, under the care of specially trained teams, with unity of control and continuity of treatment from the earliest phase of disability until complete restoration or rehabilitation. Special services were also taken to patients in the most remote parts of the country. The dominant medical principle was physiological control or rest, associated with the correction of deformity, maintenance by splintage or surgery, and gradual loco-motor re-education. Every member of the hospital team had to be fully informed of the social implications of each patient's condition, since education and occupation were considered fundamental therapeutic aids. From these provincial orthopedic centers, "the second generation of orthopaedic surgeons" (among whom the author counts himself) learned a social approach and a different type of teamwork. The central orthopedic hospital, apart from having a highly skilled nursing service, had an organization geared for every activity appropriate to the education, creative occupation, and "happiness" of the patient. Continuity of treatment has remained an essential concept in orthopedic practice, as shown by the various colleges now set up for the vocational training of disabled people, the industrial rehabilitation units, etc. Since the last war, British Governments have given first place to education and the building of new schools; but now that the time has come for considerable new hospital building, it is pertinent to ask what are to be the special concerns of orthopedics in the hospitals of the future? Segregation, although of a new type, is still important, but, the author feels, there is no justification for *isolation:* new orthopedic departments should always be in close vicinity to general

hospitals (best located at the periphery of cities and towns). Specific problems of children's and adult orthopedics are discussed in detail, and a series of suggestions for improved treatment are made. Also discussed, at the end of this paper, is the latest memorandum of the British Orthopaedic Association on accident surgery and services, which follows very much the general lines of the previous, 1943, memorandum but which was amended according to present needs.

Curricula of the Higher Medical School in the USSR (translated from the Russian for the N.I.H. Russian Scientific Translation Program), State Publishing House for Medical Literature, pp. 2–3; 58–62 (Moscow), 1957.

In 1955, the Soviet Ministries of Higher Education and of Health approved new curricula for medical, stomatological, and pharmaceutical institutes. The reformed teaching programs for higher medical schools, prepared in collaboration with scientific councils and special conferences of the teaching staff and medical student body, were designed (in compliance with a 1954 decree of the Central Committee of the Communist Party) "for better training, assignment, and utilization of specialists with higher and secondary specialized education." The most essential changes concern the curriculum for the 6th year of the Faculty of Therapeutics and the study of social sciences; the introduction of Faculty practical training for students of medical institutes who have completed 5 years of studies; alterations of the examination and credit system in anatomy and Latin; and the shifting of the course in autopsy from the 4th year to the 5th or 6th year in the Faculty of Therapeutics. The new curricular plans, approved in 1955 and revised and amended during the academic years of 1955–57, have been followed by the higher medical institutes since Sept., 1957. All curricula are published in their present form *in extenso* in this booklet. According to an explanatory note, the principal aim of the reforms is the continuous advancement in the training of specialists. The following basic principles are stated: (*a*) specialized training of general practitioners in therapeutics, pediatrics, and public health in medical institutes; of stomatologists in stomatological institutes (or Faculties); and of pharmacists in pharmacological institutes (or Faculties); (*b*) inclusion of all courses within the prescribed study hours (also military medical training); (*c*) improved practical training of students; (*d*) restriction of the number of examinations, to be taken during the annual examination period or State examination session, to a maximum of 5; (*d*) use of the 5th and 6th years to widen the students' knowledge of basic clinical sciences, and to enable them to absorb the required minimum practical experience in the fields of internal medicine, surgery, and obstetrics (Faculty of Therapeutics); pediatrics, including children's infectious diseases (Faculty of Pediatrics); and dietetics, hygiene, and epidemiology (Faculty of Public Health). The detailed curricula indicate also the weekly study load for each course, carried by every student, including lecture hours and hours assigned for practical work per week. A good deal of time, in the Faculties of Therapeutics, Pediatrics, Public Health, and Stomatology, is devoted to social studies (e.g., in the third semester, 5 hours per week are assigned to the study of the history of the Russian Communist Party and of political economy, amounting to 85 hours for the 17 weeks of the semester). For practical polyclinic training in all clinical fields, beginning with the 4th year, not less than 25 per cent of the total number of training hours is to be set aside for any given discipline. Students in the Faculty of Therapeutics, in the 5th and 6th years, are to receive 18 hours of instruction in autopsy work conducted by the Chair of Pathological Anatomy. Study hours in the basic clinical courses (internal medicine, surgery, and obstetrics) of the Faculty of Therapeutics for the entire 6th year amount to 1050 hrs. (200 hrs. are assigned to obstetrics; 500 hrs. to internal medicine and infectious diseases, and 350 hrs. to surgery). The same

principle of hour distribution is applied to the Faculty of Pediatrics in the 12th semester (150 hrs. assigned to children's infectious diseases and epidemiology; 225 hrs. to hospital pediatrics; and 75 hrs. to children's surgery and orthopedics). In the 12th semester of the Faculty of Public Health, 105 hrs. are given over to communal hygiene; 105 hrs. to epidemiology, 90 hrs. to industrial hygiene, and 60 hrs. to child and adolescent hygiene. The curriculum for the 6th year of the Faculty of Therapeutics and the 12th semester of Pediatrics and Public Health has been arranged in such a way as to permit students to continue to attend clinical and public health lecture courses and, at the same time, to encourage a maximum of independent work. The assignment of hours to theoretical and practical work in these Faculties, in the 6th year, is made at the discretion of each Faculty board, since clinical lectures must present a complete clinical review of patients throughout the course. In order to improve teaching methods in the basic clinical and public health courses in the last (6th) year of a medical institute, it is recommended that instruction in therapeutics, pediatrics, and public health be given continuously for each given subject (a *cycle*) with the students divided into *production lines*. Approved extracurricular courses (except in physical education, foreign languages, and Latin) are to be given only as lectures without credits or examinations. However, students going into the 6th year may do extracurricular practical work in industry during the month of July. The students' "free time," after a 36-hour weekly load, is largely absorbed by other specified activities, such as instruction in local air defense (1 hour per week in the 2nd semester of all faculties) or military training (2–5 hrs. per week, varying with the different faculties and years of study). As to the credit and examination system prevailing in Soviet medical schools, the booklet informs us that the students' acquired knowledge is to be checked as follows: A credit shall be given for the practical part of each subject. Instructors must systematically supervise the practical work carried out by the students (review sketches, check results of experiments, case histories, autopsy reports, etc.). After completing his practical training and obtaining the required credits, the student is permitted to take annual credits and examinations. The board of Faculty directors has the right to permit average students to take examinations before the scheduled time during the semester, but without shortening the total period of instruction. This applies also to the obtaining of credits, usually relegated by the curriculum to the regular examination period.

A Philosophy of Nursing. DOROTHY E. JOHNSON. Nursing Outlook, pp. 198–200 (April), 1959.

What is nursing? This question, the author feels, "has become an urgent cry as professional nurses seek to find and establish their identity in a rapidly expanding group of health workers." An associate professor of nursing at the Univ. of California in Los Angeles, Miss Johnson adopts Sister M. Olivia Gowan's definition of nursing "as an art and a science which involves the whole patient—body, mind and spirit; promotes his spiritual, mental and physical health by teaching and by example . . . involves the care of the patient's environment—social and spiritual as well as physical; and gives health service to the family and community as well as to the individual." However, in the last decades the increasing complexity of medical and nursing care has given rise to specialization, to a fragmentation of the individual and of services. Care of the sick has shifted from the home to "that bureaucratic institution, the hospital." A division of labor has opened the door to great numbers of subprofessional and auxiliary nursing personnel, of varying levels of training, who have become "interspersed between patient and professional nurse." There are those who firmly believe that the professional nurse of the future will have to assume largely supervising and managerial re-

sponsibilities, and that educational programs should be designed to this end. A marked trend in this direction can already be noted, and there is evidence that new graduates from some nursing schools hold this kind of "self-image," although it means a fundamental rupture in the history and tradition of nursing. In another camp, there are those who are equally convinced that nursing can and will find its place as a professional discipline only in relation to direct service to people in need of nursing care. This opinion is also emphasized by the majority of medical practitioners. However the purpose of this paper, as the author points out, is not to debate the merits of the beliefs of either camp, but to present briefly the essential issues involved and to discuss some ideas about nursing and its practice, as a direct service to people. This discussion, in which nursing is viewed as an entity, develops on the premise that there is a "common core" in nursing—in its science and its art—which can be used in many settings, with varying age groups, and at various levels of employment. This common core is now in danger of being lost from sight in our increasing trend to specialization, and it is essential, the author believes, that "this core be further developed, tested and refined, if the discipline of nursing is to advance."

The Relation of Education to Research. M. P. HALL. Nature, Vol. 183, pp. 1145–47 (April 25), 1959.

Mr. Geoffrey Lloyd, British Minister of Education, in opening a recent debate on education in the House of Commons (Jan. 22, 1959), stressed the need for maintaining a balance between the different steps in the educational ladder. The debate which followed was disappointing, the author feels, because—apart from its failure to consider expenditure and the critical issue of science teaching—secondary education was not properly considered either in relation to the educational system of Britain as a whole or to the demand for talent. The debate was also characterized by the lack of appreciation of the interdependence of the various levels of education and of the way in which expenditure at one stage might reduce expenditure at others. In the author's opinion, it is precisely such considerations which should determine Britain's expenditure on university and technical education, as well as the form university expansion should take. It is also recalled that Dr. B. V. Bowder has urgently warned that Britain needs more and bigger schools and universities in order to meet the nation's needs as a great manufacturing and trading country, and that industry has a large part to play in developing and financing this expansion. In his view, British universities do not make sufficient use of the facilities for research which are available in industry or through the Department of Scientific and Industrial Research. There is also the danger, the author points out, that organizations such as the latter become isolated from academic life, as there is the danger of isolation of the universities themselves. There are, on the other hand, complex relations and repercussions between research and teaching, and questions such as whether students in general should be encouraged to take up research unless they plan to make a career of it, or investigations as to the bearing of research on effective teaching, particularly in relation to facilities and technical assistance available to the teacher. All this, furthermore, must be related to the question of the size and distribution of universities in Britain as well as their number. Various aspects of this complex situation are discussed in the light of parliamentary debate. The author concludes that, regarding the problems of educational expansion and scientific research, there is much common ground between the major political parties and ample room for experiment without disturbing the functioning of existing institutions. An all-party approach to the problem would also help to make available the greater resources Britain needs in order to expand higher education, and secure their most effective distribution.

The Rise of Synthetic Drugs in the American Pharmaceutical Industry. MAURICE L. TAINTER and G. M. A. MARCELLI. Bulletin of the New York Academy of Medicine, Vol. 35, No. 6, pp. 387–405 (June), 1959.

The history of drugs is traced in this paper from its beginning up to our time. Although the earliest concept of the use of drugs arose long before recorded history, the search for synthetic chemical agents for medical purposes began to assume its modern form only about a century ago. Discussed in detail are the most important milestones in the development of therapeutic drugs: from Galen's extracts of botanicals (still called *galenicals* by today's pharmacists) and the Occident's adaptations of the Greco-Roman-Arabic pharmacopeia in the Middle Ages, to Paracelsus (born in 1493), "the most remarkable medical rebel of the Renaissance" and the founder of modern chemotherapeutics (through his efforts, opium, mercury, lead, sulfur, iron, arsenic, and copper sulfate were entered into the pharmacopeia); from the XVIIth and XVIIIth centuries' schools of *iatrophysics*, *iatrochemistry* and *iatromathematics* to the XIXth century's new approaches to therapeutics. After 3 centuries of "blind empirism," Liebig in Germany began to probe the potentialities of organic chemistry; Claude Bernard developed the concepts and methods essential to the systematic application of experimental reasoning to biological research; and, through these techniques, Pasteur, Koch, and Ehrlich set into motion unparalleled progress in medicine and therapeutics by the use of both the methods and fruits of chemical synthesis. The decade of the 1880's must be considered the real beginning of our present age of therapeutics, which has seen the discovery and tremendous rise of the sulfa and antibiotic drugs. On the industrial side, progress in drug manufacturing is reviewed, starting with the infant American chemical pharmaceutical industry at the time of the War of 1812 (it was launched by the firm of Farr & Kunzi, predecessor of Merck & Co.), and following its slow progress during the first 5 decades of the past century (while raising and selling of crude botanical drugs was still the mainstay of the pharmaceutical industry), to the rise brought about in the latter half of that century by the scientific discoveries, far-reaching technical improvements, and the development of nation-wide rather than local distribution. At the turn of the century, Pasteur's concept of germ as the cause of infection had made antibacterial chemotherapy a definite possibility, and soon synthetic drugs began to appear (antipyrine, sulphonal, phenatecin, acetanilid, and many others followed in quick succession). The U.S. pharmaceutical industry, however, was not concerned yet with the new synthetics, and until the outbreak of World War I their supply was left to foreign, mostly German firms. In the last quarter century after the discovery of sulfa drugs and antibiotics, improved synthetic drugs for the cure of infection, palliation of symptoms, and surer x-ray or laboratory diagnosis have come pouring out from the American pharmaceutical industry. With the advent of World War II and the tremendous therapeutic advances sparked by American industrial research, the flow of new drugs from Europe to the U.S. has been largely reversed. Furthermore, a tremendous increment in the volume of use of pharmaceuticals has taken place in this country (in 1939, the total drug sales amounted to 301 million dollars; in 1957, it had jumped to 2102 millions), together with an enormous expansion of the pharmaceutical industry. All through the 1930's a multitude of automatically controlled synthetic operations were introduced, accompanied by a steadily increasing quality of production, and a continuously decreasing cost of drugs (while hospital and other ancillary expenses for treatment have skyrocketed, the national average total expenditure for drugs in 1957 was only about $12.00 per person). However, the greatest saving in costs of medical care, it is pointed out, has not been in the price of the medicine, but in the reduction of

duration of illness and losses through sickness and death, and the American pharmaceutical industry can take justifiable pride in its share of this contribution to the national welfare. As to future developments, with the increase in the average life span (expected to reach the hundred mark by the end of the century), a whole new division of medicine, *geriatrics*, is being created to deal with the special problems of old age, and, although the field is too new to have made as yet major advances, it is attracting increased attention in the American pharmaceutical industry.

The Scientific Approach to Surgery. SIR JAMES PATERSON ROSS. British Medical Journal, pp. 26–29 (July 11), 1959.

The author, professor of surgery at the University of London, traces briefly the growth of the influence of science upon surgery, from the XVIth century to the present time. During the Renaissance period, the only science surgery could rely on as a guide was anatomy, in its infancy. However, even in those days great teachers are to be found who are still revered as shining examples, such as Thomas Vicary (around 1540), who laid down ethical rules for the conduct of surgeons, or, somewhat later, Ambroise Paré, whose treatment of wounds was a revolutionary innovation in his times (believing in the healing power of nature, he condemned the harmful effects of caustics and other forms of maltreatment). The dawn of the scientific era coincided with the later part of John Hunter's life (1728–93), who is still honored for applying the experimental method to the problems of physiology and pathology. In the XVIIIth century, another pioneer of the controlled clinical experiment was James Lind (a naval surgeon in 1747), who tested the various remedies recommended for the cure of scurvy, discovering the effective use of citrus fruit. However, not until the mid-nineteenth century did the great advances in surgery become possible, through the introduction of modern anesthesia and antiseptics. As all parts of the body became accessible to the surgeon and the patient was "made safe for surgery," a powerful stimulus for physiological research was afforded. The importance of physiology was driven home to surgeons first by the ill effects of the sudden relief of chronic obstruction in the urinary and biliary tracts, and by the edema of the brain or of the lung which followed too rapid decompression of these organs. More recently attention has been directed to the importance of water and electrolytes in the body fluid and tissues. Furthermore, the study of the response of the body to trauma has shifted beyond the purely physiological explanations and has now reached the realm of the biochemist. The recognition of the importance of physiology in clinical medicine has led to the development of "clinical science." The need to clarify the relationship between this new department of science and the clinician is stressed by the author. He warns that, while they should profit fully from the research of the pure scientist, surgeons must be careful "not to become dazzled" by the accuracy of laboratory methods and forget that the ultimate criterion for the surgeon must be the contribution he makes to the care of patients. He also draws attention to the difficulty of applying the scientific method to clinical practice which is encountered by the undergraduate as he passes from the physiological laboratory to the wards. Especially emphasized is the conflict which exists between a practical art like surgery, in which success depends on judgment, intuition, and skill, and the exactitude of science which demands the elimination of human faculty. Yet this conflict, as the author points out, "must not be made the excuse for failing to make clinical methods as accurate as possible." The clinical scientist must attempt to resolve the conflict by devising methods of investigation the results of which can be correlated with clinical observations (if he succeeds in this difficult task, Sir James warns it may become necessary to defend him against the attacks of the "pure scientist" who denies clinical sci-

The Rise of Synthetic Drugs in the American Pharmaceutical Industry. MAURICE L. TAINTER and G. M. A. MARCELLI. Bulletin of the New York Academy of Medicine, Vol. 35, No. 6, pp. 387–405 (June), 1959.

The history of drugs is traced in this paper from its beginning up to our time. Although the earliest concept of the use of drugs arose long before recorded history, the search for synthetic chemical agents for medical purposes began to assume its modern form only about a century ago. Discussed in detail are the most important milestones in the development of therapeutic drugs: from Galen's extracts of botanicals (still called *galenicals* by today's pharmacists) and the Occident's adaptations of the Greco-Roman-Arabic pharmacopeia in the Middle Ages, to Paracelsus (born in 1493), "the most remarkable medical rebel of the Renaissance" and the founder of modern chemotherapeutics (through his efforts, opium, mercury, lead, sulfur, iron, arsenic, and copper sulfate were entered into the pharmacopeia); from the XVIIth and XVIIIth centuries' schools of *iatrophysics*, *iatrochemistry* and *iatromathematics* to the XIXth century's new approaches to therapeutics. After 3 centuries of "blind empirism," Liebig in Germany began to probe the potentialities of organic chemistry; Claude Bernard developed the concepts and methods essential to the systematic application of experimental reasoning to biological research; and, through these techniques, Pasteur, Koch, and Ehrlich set into motion unparalleled progress in medicine and therapeutics by the use of both the methods and fruits of chemical synthesis. The decade of the 1880's must be considered the real beginning of our present age of therapeutics, which has seen the discovery and tremendous rise of the sulfa and antibiotic drugs. On the industrial side, progress in drug manufacturing is reviewed, starting with the infant American chemical pharmaceutical industry at the time of the War of 1812 (it was launched by the firm of Farr & Kunzi, predecessor of Merck & Co.), and following its slow progress during the first 5 decades of the past century (while raising and selling of crude botanical drugs was still the mainstay of the pharmaceutical industry), to the rise brought about in the latter half of that century by the scientific discoveries, far-reaching technical improvements, and the development of nation-wide rather than local distribution. At the turn of the century, Pasteur's concept of germ as the cause of infection had made antibacterial chemotherapy a definite possibility, and soon synthetic drugs began to appear (antipyrine, sulphonal, phenatecin, acetanilid, and many others followed in quick succession). The U.S. pharmaceutical industry, however, was not concerned yet with the new synthetics, and until the outbreak of World War I their supply was left to foreign, mostly German firms. In the last quarter century after the discovery of sulfa drugs and antibiotics, improved synthetic drugs for the cure of infection, palliation of symptoms, and surer x-ray or laboratory diagnosis have come pouring out from the American pharmaceutical industry. With the advent of World War II and the tremendous therapeutic advances sparked by American industrial research, the flow of new drugs from Europe to the U.S. has been largely reversed. Furthermore, a tremendous increment in the volume of use of pharmaceuticals has taken place in this country (in 1939, the total drug sales amounted to 301 million dollars; in 1957, it had jumped to 2102 millions), together with an enormous expansion of the pharmaceutical industry. All through the 1930's a multitude of automatically controlled synthetic operations were introduced, accompanied by a steadily increasing quality of production, and a continuously decreasing cost of drugs (while hospital and other ancillary expenses for treatment have skyrocketed, the national average total expenditure for drugs in 1957 was only about $12.00 per person). However, the greatest saving in costs of medical care, it is pointed out, has not been in the price of the medicine, but in the reduction of

duration of illness and losses through sickness and death, and the American pharmaceutical industry can take justifiable pride in its share of this contribution to the national welfare. As to future developments, with the increase in the average life span (expected to reach the hundred mark by the end of the century), a whole new division of medicine, *geriatrics*, is being created to deal with the special problems of old age, and, although the field is too new to have made as yet major advances, it is attracting increased attention in the American pharmaceutical industry.

The Scientific Approach to Surgery. SIR JAMES PATERSON ROSS. British Medical Journal, pp. 26–29 (July 11), 1959.

The author, professor of surgery at the University of London, traces briefly the growth of the influence of science upon surgery, from the XVIth century to the present time. During the Renaissance period, the only science surgery could rely on as a guide was anatomy, in its infancy. However, even in those days great teachers are to be found who are still revered as shining examples, such as Thomas Vicary (around 1540), who laid down ethical rules for the conduct of surgeons, or, somewhat later, Ambroise Paré, whose treatment of wounds was a revolutionary innovation in his times (believing in the healing power of nature, he condemned the harmful effects of caustics and other forms of maltreatment). The dawn of the scientific era coincided with the later part of John Hunter's life (1728–93), who is still honored for applying the experimental method to the problems of physiology and pathology. In the XVIIIth century, another pioneer of the controlled clinical experiment was James Lind (a naval surgeon in 1747), who tested the various remedies recommended for the cure of scurvy, discovering the effective use of citrus fruit. However, not until the mid-nineteenth century did the great advances in surgery become possible, through the introduction of modern anesthesia and antiseptics. As all parts of the body became accessible to the surgeon and the patient was "made safe for surgery," a powerful stimulus for physiological research was afforded. The importance of physiology was driven home to surgeons first by the ill effects of the sudden relief of chronic obstruction in the urinary and biliary tracts, and by the edema of the brain or of the lung which followed too rapid decompression of these organs. More recently attention has been directed to the importance of water and electrolytes in the body fluid and tissues. Furthermore, the study of the response of the body to trauma has shifted beyond the purely physiological explanations and has now reached the realm of the biochemist. The recognition of the importance of physiology in clinical medicine has led to the development of "clinical science." The need to clarify the relationship between this new department of science and the clinician is stressed by the author. He warns that, while they should profit fully from the research of the pure scientist, surgeons must be careful "not to become dazzled" by the accuracy of laboratory methods and forget that the ultimate criterion for the surgeon must be the contribution he makes to the care of patients. He also draws attention to the difficulty of applying the scientific method to clinical practice which is encountered by the undergraduate as he passes from the physiological laboratory to the wards. Especially emphasized is the conflict which exists between a practical art like surgery, in which success depends on judgment, intuition, and skill, and the exactitude of science which demands the elimination of human faculty. Yet this conflict, as the author points out, "must not be made the excuse for failing to make clinical methods as accurate as possible." The clinical scientist must attempt to resolve the conflict by devising methods of investigation the results of which can be correlated with clinical observations (if he succeeds in this difficult task, Sir James warns it may become necessary to defend him against the attacks of the "pure scientist" who denies clinical sci-

ence a rank among the "true sciences"). As to methods of precision, it is essential that the clinician avail himself of all the precise information he can obtain with the aid of radiography, electrocardiography, etc., and through his colleagues in the departments of pathology and bacteriology, but while these methods of precision are "good servants," they are "bad masters" and can weaken or even abolish an element essential to the making of a good clinician: his power of decision. As clinical science develops it becomes more urgent—and more difficult—to reconcile the interests of the scientist with those of the clinician. One method of harmonizing these interests is the establishment of professional clinic units. Their most important function is to study recent advances in the preclinical sciences, to consider whether these should be incorporated in clinical teaching and practice and how this can best be brought about. As to the training of the young surgeon, the author feels it would be a great mistake "to try to make him into a pseudo-scientist." What he considers essential is to give him the opportunity of acquiring a scientific mode of thought, an attitude of mind which should enable him to make accurate and "controlled" observations; to collect his results and arrange them for analysis recognizing the margins of error, and to make logical deductions from these results, perhaps leading to practical application. To possess this scientific outlook he needs a certain basic knowledge of the preclinical sciences, and, since the little he has acquired as an undergraduate usually does not survive even the first clinical year, he must, as a postgraduate, experience for two years the discipline of a laboratory (or, if he cannot afford the time, he should undergo a 6-month really thorough revision course).

Use of Films in Teaching Anatomy in the United States and Canada. J. E. MARKEE. Medical and Biological Illustration, Vol. 9, pp. 105–7 (April), 1959.

Questionnaires, sent out in 1951 and in 1958 to 100 departments of Anatomy, show that the use of films in the teaching of anatomy in the U.S. and Canada has increased about 400 per cent during the last 7 years. In the 90 departments reporting, there have been 2,150 showings of films in the last year (1,154 in gross anatomy; 453 in histology; 323 in embryology, and 220 in neuroanatomy); 379 different films were used. Several tables, inserted in this report, present detailed figures on the number of times individual films were shown; the use of films in the teaching of histology and neuroanatomy in the 90 schools listed, and a comparison of the number of feet owned with the number of hours assigned to the teaching of histology and neuroanatomy and the teaching of gross anatomy and embryology. There is, the author asserts, a positive correlation between the number of films shown and the average number of feet owned, if one considers the schools in groups. Comments were added to more than half of the questionnaires returned, the one most frequently made expressing a need for more information to help the schools obtain films. Only six of the comments disapproved of the use of motion picture in the teaching of some aspects of anatomy; five schools planned to use films more extensively; six stated that the effectiveness of most films was increased by adequate introductions, summaries or discussions following the showing, or a second showing after a few days. Two schools were investigating the accelerated learning expected from the combined use of films and other audio-visual aids. The same questionnaire also revealed that the increased use of films is not confined to those produced since 1951, but that the increase has resulted both from the availability of new films and the greater use of older ones.

NEW BOOKS

KENNETH E. PENROD
Book Review Editor

Abstracts

A Way of Life and Selected Writings of Sir William Osler. Paper-back edition by Dover Publications, Inc., New York, under special arrangement with Oxford University Press.

Dover publications has now made available in a paper-back edition at $1.50 the complete unabridged book on Sir William Osler's writings, published first as a centenary tribute in 1950. It is the hope of the publishers that this work can thus be made available to medical students at a price all can afford to pay.

Synopsis of Ear, Nose and Throat Diseases. By ROBERT E. RYAN, WILLIAM C. THORNELL and HANS VON LEDEN. St. Louis: C. V. Mosby Co., 1959. 369 pp. $6.75.

This book was written to serve as a handy guide to the family physician, the intern, and the medical student, and as a ready reference for nurses and speech pathologists. It is a digest of the common ailments in this specialty. To facilitate the practical use of this volume, the material has been divided into four parts dealing with the ears, the nose and paranasal sinuses, the pharynx, and the larynx. Each part begins with a brief but concise review of the medical anatomy and physiology. The simple tests and techniques required for routine examination of the cavities are presented. The common diseases affecting the ears, nose, and throat are discussed in relation to their etiology, pathology, symptomatology, prognosis, and therapy. In addition, the symptoms and treatment of the more common conditions are repeated in outline form at the end of each chapter. Surgical procedures are described only insofar as they are of interest to the family physician, intern, or student on a general hospital service.

Synopsis of Ophthalmology. By WILLIAM H. HAVENER. St. Louis: C. V. Mosby Co., 1959. 282 pp. $6.75.

This book is designed to present the practical viewpoint of the practicing ophthalmologist to help physicians in the diagnosis and management of eye diseases. Seemingly trivial details may make the difference between a well treated, seeing eye and visual tragedy. It is the hope of the author that such details as are concisely presented in this book will help to prevent unnecessary blindness and disability.

Early Diagnosis. Edited by HENRY MILLER, with 25 contributors. Baltimore: Williams & Wilkins Co., 1959. 375 pp. $6.50.

The early recognition of important disease is the special responsibility of the general practitioner, for whom this book has been written. It is he who must appreciate the signs which will lead him to commission on behalf of his patients the elaborate, expensive, and sometimes even potentially dangerous machinery of modern medical investigation. Early diagnosis is both a source of intellectual satisfaction and the basis of reliable prognosis. For these reasons no apology is offered for the presentation of these practical essays dealing with an aspect of clinical medicine often covered only by implication in the standard texts.

Clark's Applied Pharmacology. By ANDREW WILSON and H. O. SCHILD. 9th ed. Boston: Little, Brown & Co., 1959. 720 pp. $10.00.

In this the 9th edition the authors have tried to preserve the characteristic features of a book in which its original author, A. J. Clark, presented the subject of pharmacology in relation to the cognate disciplines of physiology and of medicine. The aim has been to provide the student, undergraduate, and postgraduate with a background of factual knowledge and to stimulate a critical approach to the increasingly complex problems of drug therapy. Most of the chapters have been rewritten, and new chapters have been added on the pharmacology of tuberculosis and on psycho-pharmacology. Sixty-five

new figures have been added. Material on human physiology and pathology is integrated throughout, and whenever possible the textual discussions are illustrated by actual observations made upon patients in disease.

Clinical Coordination of Anatomy and Physiology. By MARTHA PITEL and MILDRED SCHELLIG. New York: Springer Publishing Co., Inc., 1959. 316 pp. $5.50.

This paper-back volume is written primarily for nursing students. An attempt has been made to correlate anatomy with surgery and physiology with medicine. The clinical background is provided by 57 case histories selected to give a cross-section of frequently encountered cases and a broad learning experience. The material is presented in workbook form, with questions concerning the case histories as well as classroom and laboratory work. Emphasis is on the human body. Pathology and the sociological and psychological aspects of the cases have not been included. Dissection of the cat is described, but the rabbit may be substituted. If time does not permit student participation in the laboratory, prosections and demonstrations may be used. The book does not follow the system of any particular textbook. References are freely listed, and consultation of other texts is encouraged. Since the book "correlates" it should retain its value throughout the curriculum.

Color Atlas and Management of Vascular Disease. By WILLIAM T. FOLEY and IRVING S. WRIGHT. New York: Appleton-Century-Crofts, Inc., 1959. 167 pp. $18.00.

There has been a great deal of literature on the subject of vascular diseases, but no book of color description. This book should be most helpful to the practicing physician who has to deal with problems of diagnosis. The color changes which must be understood for accurate diagnosis cannot be portrayed by black and white illustrations. From the vast files of the authors, carefully selected cases are discussed, and the diagnosis and pathogenesis of the diseases are explained with their treatment. The principles of therapy are on the whole conservative, but some cases are described in which radical measures were effective. The details of surgical technique are not included, because they are beyond the scope of this atlas. Nevertheless, surgeons will be greatly interested in the conditions illustrated. "Nomenclature and Criteria for Diagnosis of the Diseases of the Heart and Blood Vessels" published by the New York Heart Association in 1953 has been used as the basis for terminology.

Surgical Service Guide. By LOUIS T. PALUMBO. The Year Book Publishers, Inc., 1959. 200 pp. $6.00.

This book should be a useful guide to staff surgeons, surgical residents, and surgical nursing staff as well as other members of the medical profession and ancillary professional personnel. It has been used for the past 13 years in the author's own service and as a valuable tool in his postgraduate residency training program. It is designed as an aid in the management of many of the common surgical problems and conditions seen in patients admitted to any hospital or service. Many colleagues have contributed significantly to the material presented.

Diagnosis of Congenital Heart Disease. By SVEN R. KJELLBERG, EDGAR MANNHEIMER, ULF RUDHE, and BENGT JONSSON. 2d ed. Chicago: The Year Book Publishers, Inc., 1959. 866 pp. $28.00.

The presentation of the difficult and multifaceted problems in the diagnosis of congenital heart disease has already been accomplished in a most lucid manner in the first edition of this reference work. In the second edition, much that is new has been added. The case material which provides the basis for this book has been nearly doubled during the past 4 years, and the introduction of new methods for examination and diagnosis, together with improvements of older methods, makes this book as up-to-date as possible. There are several new chapters, and new types of congenital heart disease have been recognized and described. The book contains an extensive bibliography but one which the authors take care to point out is not designed to be complete. This is because the book is intended to be primarily an account of personal observations made by the authors at the Department of Clinical Physiology, Karolinska Sjukhuset, and not a summary of the existing literature. This refreshing point of view greatly enhances the value of a valuable book.

Anesthesia for Infants and Children. By ROBERT M. SMITH. St. Louis: C. V. Mosby Co., 1959. 409 pp. $12.00.

During the past few years the scope of pediatric anesthesia has been greatly extended, and numerous contributions have been made in both technical and theoretical aspects. This material has been widely scattered, and it is the author's intention to organize and evaluate this information in this volume as well as to add first-hand experience and observation. It is assumed that those who use this book will be familiar with the essentials of general anesthesia; consequently, detailed information concerning anesthetic agents and techniques commonly used for adults is not included. Greater emphasis is placed on information which anesthetists usually lack when called upon to care for infants and children. In many instances this concerns pathology, pediatrics, or surgery rather than anesthesia. It is the purpose of this book to place such information within easy reach of the anesthetist whose experience with young patients has been limited.

The Care of Minor Hand Injuries. By ADRIAN E. FLATT. St. Louis: C. V. Mosby Co., 1959. 260 pp. $9.50.

In the title of this book the word "minor" will be understood to imply a relative small amount of tissue damage, out-patient treatment, and freedom from post-operative complications. The book is the outgrowth of a scientific exhibit of the same title, and the material is designed to include the types of cases which discussions at the exhibit showed to be troublesome to general practitioners. The presentation is purposely dogmatic, as the author feels that it is not presented as the only, or even necessarily the best, specific treatment, but at least it can be said that his experience has shown that the method is safe and practical. The book is written for one whose background and experience are not such as to allow him to choose between alternatives presented with equal emphasis. The book is designed in two sections: the first stresses the important general principles, a knowledge of which is fundamental in good care of the injured hand, and the second contains a detailed discussion of the treatment of the various types of injuries.

Handbook of Physiology. Section 1: Neurophysiology I. Editor-in-Chief: JOHN FIELD. Section Editor: H. W. MAGOUN. Executive Editor: VICTOR E. HALL. Washington, D. C.: American Physiological Society, 1959. 760 pp. $22.00.

The American Physiological Society has undertaken the publication of a multi-volume "Handbook of Physiology," somewhat in the tradition of the great German "Handbuch," now long out of date. The Handbook will provide a comprehensive survey of the experimental findings and the concepts which constitute the substance of present-day physiology. While it will afford a contemporary view of the science, the intent is to present the various facets of the subject in due proportion to their importance regardless of the time when the discoveries and formulations were made, and without disproportionate emphasis on the research of the last few years. It is thus not devoted unduly to "recent advances." The first three volumes of the Handbook, of which this is the first, constitute the "Section on Neurophysiology." The Handbook is addressed to students, young and old, with considerable background in physiology, who need to raise their level of understanding and sophistication to that adequate for predoctoral study, for teaching and for preliminary orientation in preparation for research. From their perusal, the student should be prepared for informed and critical study of the current physiological literature.

A Handbook for Dissectors. By J. C. BOILEAU GRANT. 5th ed. Baltimore: Williams & Wilkins Co., 1959. 419 pp. $5.00.

Although the essential contents of this edition remain the same, the text has been modified throughout, particularly with regard to the instructions as to procedure which are given in more detail in the hope that the dissector may be enabled to proceed successfully along at such times as the help of an instructor is not available. A hundred or more figures have been added, scattered throughout the text. The new international nomenclature (N. A. P.), is employed in place of the Birmingham Revision of the B. N. A., previously in use. To bridge the gap, where old and new terms differ considerably from one another, the old synonyms are given in brackets after the new at their first appearance. The Handbook remains a guide to the orderly, consecutive dissection of the human body, and it is in no sense a textbook.

Atlas of Human Anatomy. By FRANZ FROHSE, MAX BRODEL, and LEON SCHLOSSBERG. 5th ed. New York: Barnes & Noble, Inc., 1959. 167 pp. $2.95 (paper), $4.50 (cloth).

This new edition of the "Atlas of Human Anatomy" provides in pocket size: (1) a complete and perfectly reproduced set of the Frohse-Brodel wall charts; (2) Leon Schlossberg's equally expert supplementary charts; (3) an explanatory text written by Dr. Samuel Smith and edited by Dr. Ashley Montagu; (4) ten special color charts of the endocrine system; (5) 22 scale drawings showing enlarged microscopic sections—their cells and blood vessels; (6) a description of the endocrine glands by Charles F. Geschickter; and (7) numerous line drawings taken from E. B. Steen and M. F. Ashley Montagu's "Anatomy and Physiology." For convenient reference the nomenclatures appear on the same pages as the charts. The terms used throughout the text and chart sections incorporate many of the changes approved by the most recent International Congress of Anatomists. This atlas, in its present new edition, should meet the needs of both the medical practitioner and the layman for a brief text and a convenience reference work in this important science.

A Synopsis of Skin Diseases. By BETHEL SOLOMONS. Baltimore: Williams & Wilkins Co., 1959. 272 pages. $6.75.

This book, as a companion volume to the others in the Synopsis Series, aims at providing the important aspects of skin diseases at the present time. The book is intended for the busy practitioner, for those who have to revise the subject rapidly, and also for the student about to take his final examination. It is not meant to replace the larger scope of a textbook. This is a handy pocket-size edition available for ready consultation.

Synopsis of Anesthesia. By J. ALFRED LEE. 4th ed. Baltimore: Williams & Wilkins Co., 1959. 578 pp. $6.50.

A very complete revision has been carried out on this edition, and the alterations and additions are too extensive, involving almost every page, to outline them in detail. Two new chapters have been added: one on the phenothiazine derivatives, and the other on induced hypothermia. There is a new section dealing with halothane (fluothane). This edition differs from the previous one in having many new figures. The book is not designed to take the place of the larger textbooks of anesthesia and analgesia. It is a summary of current teaching and practice, and it is the hope of the author that it will serve the student, the resident, the anesthetist, the practitioner, and the candidate studying for certification in anesthesiology.

Aids to Arithmetic in Nursing. By WILLIAM C. FREAM. 2d ed. Baltimore: Williams & Wilkins Co., 1959. 200 pp. $2.25.

The Nurses' Aids Series is designed to provide a series of textbooks in the various fields of knowledge required by the modern nurse. New volumes are added to the series from time to time. Each volume is a complete textbook on its subject and is not designed as an aid to the study of larger books. The whole series aims at providing concisely, clearly, and simply just that quantity of information which the nurse needs to possess, gathered together in well illustrated, easily read, and easily carried volumes at a price within the means of any nurse. The second edition of this volume contains much new material, including a small section on Roman Numerals, a chapter on Weights and Measures, and a brief explanation of solutions. These editions are not so weighty that they defeat the original intention of the book, namely, to provide a simple-to-use guide to arithmetic in nursing.

REPORT OF THE 70th ANNUAL MEETING

Approximately 900 medical educators and guests from the United States, Canada and several foreign countries heard 35 of the Nation's leaders in medicine, education, industry, philanthropy and government discuss varying aspects of the theme, "Medical Education in a Changing World" at the 70th Annual Meeting of the Association of American Medical Colleges. Held at the Edgewater Beach Hotel in Chicago, Nov. 2–4, Dr. John McK. Mitchell, AAMC 1959 President presided over the sessions.

Mitchell Warns of Doctor Shortage

"The need to produce 3,600 additional physicians a year by 1975 in order to keep pace with a growing population is a problem of such magnitude that it demands the immediate attention of all medical schools and all other groups concerned with medical education," the President of the Association of American Medical Colleges asserted at the opening session of the 70th Annual Meeting.

John McK. Mitchell, M.D.

Dr. John McK. Mitchell, Dean of the University of Pennsylvania School of Medicine, referred to the findings and recommendations made by the Consultant Group on Medical Education of the United States Public Health Service, of which he is a member. Their report, "Physicians for a Growing America" has just been released.

In his talk, "The Medical Schools are the Keystone of Medical Progress," Dr. Mitchell warned that we are already falling short of maintaining the ratio of physicians to population that has existed in the United States since 1940, a level considered by the report to be a minimum satisfactory goal. Mitchell pointed out that the two stumbling blocks to obtaining an ample supply of well qualified students lay in the length and cost of medical education. Noting that ample scholarships are available nationwide to Ph.D. candidates in fields related to medicine—such as physics, chemistry, and biology—he revealed that there are no federal, local or private programs of scholarship aid for medical students comparable to those for other graduate students. He believes, therefore, that it is up to the medical schools to raise funds for scholarship and loan funds from both private and governmental sources.

Dr. Mitchell said the report offered three solutions for meeting the medical manpower requirements: increased enrollment in existing schools, inauguration of new programs of basic medical science, and the establishment of new 4-year medical schools. He emphasized that a major contribution must come from new 4-year schools. However, he continued, if $325 million were available for new construction and renovation of teaching facilities, existing schools could increase their annual admissions by about 1,060 students. He urged that steps be taken to provide the necessary funds.

In another report to the medical educators, Dr. Leroy E. Burney, Surgeon General of the U.S. Public Health Service, said "The problems of medical education will not be solved unless they are recognized and dealt with as matters of public policy by responsible leaders at all levels of government and in all sectors of national life."

Surgeon General Burney

Dr. Burney told his audience that the Public Health Service and the Department of Health, Education, and Welfare have taken their share of this responsibility and will continue to use all resources at their command to further reasonable solutions. He pointed out that the medical schools also can contribute to this effort by "helping convince the American public that the need exists for a multimillion dollar expansion of existing schools and the establishment of 20 to 24 new two-year and four-year schools." The Surgeon General also based his statements on the new report of the Consultant Group on Medical Education.

He explained that in view of mounting concern about the Nation's supply of physicians, he established the Consultant Group in November, 1958. The chairman was Mr. Frank Bane who, until his recent retirement, was the Executive Director of the Council of State Governments. The 22 other members of the group included the directors of the Southern Regional Education Board and the Western Interstate Commission for Higher Education, and representatives of medicine, dentistry, nursing, education, private foundations, and the public.

The principal recommendation of the consultants, the Surgeon General said, was directed toward bringing about an increase in the number of physicians graduated annually from schools of medicine and osteopathy from the present 7,400 to some 11,000 by 1975.

The group also stressed the need for development of medical educational opportunities in areas which now lack adequate facilities and urged the States to undertake appropriate action to meet these needs. Dr. Burney said the report also urges Federal action in the areas of construction, research, and educational grants-in-aid.

Pharmaceutical Manufacturer Cites Challenges of the Future

Spectacular progress in medicine and in science in recent years has brought the challenge to medical educators of preparing graduates to use a vast and rapidly expanding fund of advanced knowledge, Eugene N. Beesley, president of Eli Lilly and Company, said at the opening of the second day's session.

Eugene N. Beesley

The next decade will see no lessening of the challenge, Mr. Beesley told his audience. New drug therapy resulting from greatly increased research spending by the pharmaceutical industry and Government will continue to have an enormous impact upon the curriculum of medical colleges, he asserted.

Citing broad responsibilities that face individuals and organizations in the health field, he held that the task of making medical services in this country, which are already the best in the world, increasingly better will require effective communications and cooperative efforts by all groups connected with medical care. The responsibility for constructive action and improvement is being shouldered by many dedicated people

and organizations, he said, and this must continue.

It is also the responsibility of those in the medical service field, Mr. Beesley emphasized, to help the public gain an understanding of the operations of medical schools, hospitals, pharmaceutical plants, pharmacies and other institutions that are essential to good medical services.

Facilities for Postgraduate Training Also Found Wanting

Reporting as part of a panel on the 1959 Teaching Institute, Dr. I. S. Ravdin noted that the shortage of facilities and opportunities for adequate postgraduate training of physicians is every bit as critical as the problems the medical schools are experiencing for increasing the production of M.D.'s. Dr. Ravdin is Vice-President for Medical Affairs at the University of Pennsylvania.

He declared, "One of the major problems facing the recently graduated physician is the extremely low pay of interns and residents by the hospitals in which they work." Following completion of the internship, "as high as 90 per cent wish to receive residency training in one aspect of medicine or surgery, or their specialties. This may take from two to five years, during which time they are also paid a totally inadequate salary," Dr. Ravdin said. He added that a great many of these physicians are married and have children at the time they are receiving special training. "If we are to have the best of our young men seek a career in medicine, we shall have to do something about the very important matter of adequate pay during the training period," he asserted.

Dr. Ravdin questioned the need for the mandatory internship of new physicians as a necessary part of the training program. "The internship was invaluable at a time when the clinical clerkship, and residency training either did not exist or were in their infancy," he said. He noted, "Today in far too many institutions, the internship is a type of 'slave labor' wherein the intern merely extends slightly, if at all, the essential training which he obtained as a clinical clerk either in the third or fourth year, or both, of his medical education. The very wide extension of the residency training program in a variety of subjects has made the internship less and less valuable as an educational experience." Dr. Ravdin believes the residency should be a rich educational experience, and should provide opportunities for an increase in responsibilities with each year of training. The resident will be further enriched, he contended, if he participates for a portion of his training in the care of private and semi-private patients.

In the realm of evaluating senior medical students, Dr. Ravdin supported the job being done by the National Board of Medical Examiners in helping medical schools assess their own progress and in determining specific areas of deficiency. He discounted the effectiveness of state medical examining boards, stating that "we could well do without them if a broader viewpoint became acceptable."

Residents, he continued, should not be led through their training with the goal of passing a specialty board examination. "The properly selected and adequately supervised resident, who is provided with increasing opportunity and responsibility with each period of training will pass his board examination," he said.

Oak Ridge Scientist Reveals Increases in Radiation Accidents

The safe administration of radioactive drugs to humans and the handling of severe radiation exposure were two of the major problems in nuclear medicine stressed by Dr. Marshall Brucer, chairman of the medical division, Oak Ridge Institute of Nuclear Studies, in his address before the 70th Annual Meeting.

"We have a 'bandwagon' problem in nuclear medicine, and this is the problem of radiation accidents," Dr. Brucer warned. "Radiation accidents are increasing exponentially. The absolute number is still small, but the rate is already 100 times that of automobile accidents. With the probabil-

ity of accidents increasing with each new device for producing radiation, and with an increased potentiality for the deliberate destructive use of radiation, physicians must be ready to treat radiation just as they are ready to treat every other affliction of the body."

In relating this problem to medical education, Dr. Brucer said, "There is no cookbook of instructions that can be given to the medical student. However, there are things that can and should be done." He felt that the same kind of training that a physician is given to estimate the dose of a drug or a food, or a drink, or a poison, is necessary in the field of nuclear medicine.

He deplored the fact that in nuclear medicine there are so many non-medical workers who control dose but have not been trained to handle dangerous materials. "In this sense we could say that the medical school curriculum is four years of training in handling deadly drugs with safety. In this same sense we can say that we are adding a small piece to the medical curriculum—how to administer radioactive drugs to humans with reasonable safety."

The Next Ten Years and the AAMC

After reviewing the past activities of the Association of American Medical Colleges, Dr. Ward Darley, Executive Director, outlined plans for its future role in achieving the goals necessary to the improvement and the advancement of medical education. He stated, "The most important needs here center around the strengthening of the elements of the educational process itself—the learning of students and the teaching of teachers, and also around the facilities and financing necessary if the educational process is to be properly nurtured."

Ward Darley, M.D.
AAMC Executive Director

Darley indicated that the AAMC is looking forward to long-range growth in maintaining its effectiveness in serving the medical schools and medical education as a whole. He cited the many activities performed by the AAMC, and the lines of communication necessary to maintaining this effectiveness. He also emphasized the importance of communication between higher education, the hospitals, industry, government, foundations, and other health professions. Darley stressed that leadership must come from outside the field of medicine as well as within in gaining all the knowledge possible about medical education, and that, "the medical schools must play the key role in gathering this information and in informing this leadership." He added that by doing so, the schools must utilize their own organization—the AAMC. He therefore urged a closer cooperation and a mutual assistance, thereby precluding the possibility of wasteful duplication of effort.

Dr. Darley pointed out that whereas the Association has had financial support from various foundations and agencies, he believes that more of the hard core of support must come from its member schools and faculties. Noting that there are some 2,000 individual memberships in the Association, he stated that there could be many thousands more. Realizing that this kind of membership can only grow as our faculties become personally involved in educational and creative activities that are stimulated by the work of the AAMC, he feels this should be no problem because, "if the Association is to justify its existence by increasing the stature of medical education, it will be because of such involvement."

Is Our Educational Span too Long?

The assembly heard Dr. Aura Severinghaus, associate dean of Columbia University's College of Physicians and Surgeons report on "The Resurvey of Pre-professional Education: Trends and Outlook in the Liberal Arts Colleges" in which 115 colleges and schools participated. From this report he stated, "There is a growing belief among educators that the total formal educational

span is too long and that with the rapidly increasing factual knowledge, it can only be expected to grow longer." The speaker said that it is becoming increasingly desirable and essential to find ways and means whereby, through closer integration of the educational states, especially from secondary through professional schools, we may shorten the span and at the same time teach more effectively. The survey revealed there is a quickened interest in a balanced liberal education, a growing concern for a better sense of values, and a widespread disapproval of the waste and inefficiency which results from our disjointed periods of formal education. "This particular problem of shortening the total educational span is more imperative when we take into consideration the fact that in all probability the youth of America will have to give at least two years to military service," Dr. Severinghaus said.

"Many medical educators have warned that medical education itself is becoming so specialized and so vocationally oriented that students graduate from medical school having lost interest in and the benefits from a background of general education which the previous college years had provided," he declared. Severinghaus reported that in some medical schools special efforts are underway to develop a program of medical education in which some aspects of liberal education will be carried over into the medical school years.

Those attending the 70th Annual Meeting heard Dr. Roger L. Buck of the Harvard Medical School challenge the beliefs of those who advocate changes in the medical school curriculum to approximate that of the better liberal arts graduate schools. He acknowledged that there was much merit in this thinking, but he contended too little recognition has been given to some of the basic dissimilarities between the traditional medical curriculum and that of the graduate disciplines. Dr. Buck stated that the graduate school concept for medical education should begin in the undergraduate, pre-clinical college programs. "That is, we must see to it that the transition from spoon feeding to self-motivated education is made in the pre-medical years. There will be no time for this in medical school."

AAMC Bestows Awards at Annual Banquet

Top awards were given to Dr. Theodore T. Puck of Colorado, and Dr. Alfred Newton Richards of Pennsylvania, at the Association's Annual Banquet, Monday evening, November 2. Dr. Puck was named winner of The Borden Award "for outstanding research in medicine conducted by a member of the faculty of an affiliated college." He has been professor and head of the department of biophysics at the University of Colorado School of Medicine since joining their staff in 1948. Dr. Puck received a gold medal and $1,000.

Theodore T. Puck

The Abraham Flexner Award for Distinguished Service to Medical Education was presented to Dr. Richards, age 83, emeritus professor of pharmacology at the University of Pennsylvania.

Alfred N. Richards

The award presentations were made by Dr. Thomas B. Turner, dean of the Johns Hopkins University School of Medicine and by Dr. William Bean, professor and head of the department of medicine at the State University of Iowa.

Over the past 18 years, Dr. Puck has made many contributions to medical science in the following areas: airborne-infections

and their prevention; vapor-liquid equilibria; mechanism of virus attachment to host cells and cell-wall penetration by viruses. Principal basis of The Borden Award is Dr. Puck's development of a method of testtube cultivation of colonies from single mammalian cells. This new tissue culture technique has enabled Dr. Puck to measure the effect of x-radiation on single cells; has characterized the relationship between the dose of radiation and the percentage survival of cells.

Dr. Puck was a Phi Beta Kappa graduate of the University of Chicago in 1937. He received his Ph.D. in Physical Chemistry in 1940, and remained at the university in a teaching and research capacity until 1947.

Dr. Richards was professor of pharmacology at the University of Pennsylvania from 1910 until 1946, and served as Vice-President for Medical Affairs from 1939 to 1948. During World War II, he was chairman of the Committee on Medical Research of the Office of Scientific Research and Development. From 1947 to 1950, he served as president of the National Academy of Sciences.

At the time Abraham Flexner was writing his famous report of 1910, Dr. Richards was setting a pattern of personal attention to student teaching exercises, of emphasis on critical examination of evidence, and of a continuous search for improvement in all possible ways. He was a pioneer in combining research with teaching of medical students, thereby becoming one of the early advocates of the laboratory method of instruction. He is best known scientifically for his outstanding research in kidney function. His work is credited with resolving the century old differences between two schools of thought regarding how the kidney separated wastes from the blood and discharged them as urine.

The Association chose Warren Weaver to present the Alan Gregg Memorial Lecture at the group's annual banquet. Dr. Weaver joined the Rockefeller Foundation as Director of the Division of Natural Sciences in 1932 and was made Vice President of that divison in 1955. He was recently appointed Vice President of the Alfred P. Sloan Foundation.

He told his audience, "Keeping the practicing physician in close touch with scientific developments should be one of the major aims of medical education today." He added, "There is a discouraging gap in medicine between what we know and what we do." Despite the great scientific and technical advances achieved in the field of medicine, the speaker said, "It must be confessed that we have not as yet evolved a truly satisfactory method of bringing all this new science of medicine to the service of men."

He cited recent studies which showed that the practicing doctor often utilizes a "disappointingly small fraction" of the scientific techniques, skills, and procedures which were laid before him in medical education.

Excellent new modes of communication have been developed, Weaver pointed out, but the medical profession has failed to develop effective procedures for keeping the practicing doctor in continuing touch with scientific developments that he should know about and should use. "When we talk about improving medical education," Dr. Weaver declared, we are often merely referring to what happens in medical school and during the immediately subsequent years of apprentice training."

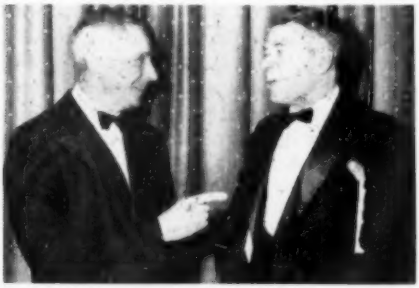
The medical educator should be concerned with the longer-term aspects of medical education—with the problem of bridging more effectively the gap between the opportunities of formal training in medical school and the realities of subsequent practice, Weaver said.

"One could say, with considerable justification, that we do not need to improve the physical facilities or intellectual content of teaching so much as we need to improve the techniques for learning, for continuing to learn, and for using the information which is learned."

BUSINESS MEETING

Installation of Officers

The third and concluding day of the 70th Annual Meeting was devoted to matters of business. Dr. Thomas H. Hunter, Dean of the University of Virginia School of Medicine was installed as president; named president-elect, Dr. George N. Aagaard, Dean of the University of Washington School of Medicine (Seattle); Vice-President, Dr. Donald R. Anderson, Dean, University of Rochester School of Medicine; Secretary, Dr. Richard H. Young, Dean, Northwestern University Medical School; and Treasurer, Dr. J. Murray Kinsman, Dean of the University of Louisville School of Medicine.



Dr. Mitchell and Dr. Hunter

New to the Executive Council are: Dr. Robert J. Glaser, Dean of the University of Colorado School of Medicine and Vice-President for Medical Affairs, and Dr. Robert C. Berson, Dean and Vice-President for Health Affairs in the Medical Center, University of Alabama—replacements for Dr. Mark R. Everett and Dr. Gordon H. Scott, whose terms expire this year.

The Association offered a Memorial Resolution to the late Abraham Flexner and this was passed by a standing vote.

The Association honored the following medical educators by naming them emeritus members of the AAMC: Dr. Walter A. Bloedorn, Dr. Harold S. Diehl, Dr. Herman G. Weiskotten; Dr. William E. Brown, Dr. A. C. Fuerstenberg, Dr. William S. McEllroy, and Dr. William Harvey Perkins.

MCAT To Be Conducted by Psychological Corporation

Dr. Darley announced that as of July 1, 1960, the Medical College Admission Test Program will be conducted by the Psychological Corporation. The entrance examination, which is required of applicants to medical schools in the United States, will continue to be offered semiannually at 200 testing centers throughout the United States, Canada, and abroad. Results will be sent to the medical colleges where the applicants are seeking admission and will be used in the selection process. The testing program has been carried on for the past ten years by the Educational Testing Service.

Federal Health Programs

Recognizing the fact that the institutional members must be kept alerted to the proposals that will be presented to Congress regarding matters having a major impact on the conduct of medical education and medical schools in the future, a Resolution was approved whereby: 1) the Executive Council of the AAMC is instructed to study these proposals and make recommendations to the member schools for their consideration and action at a special meeting of the Institutional Members to be called, if possible, before the opening of the next session of Congress, and 2) that the Executive Council effect an arrangement whereby the Association can keep in continuing communication and consultation with those agencies of the Federal Government that have interests or programs that concern the welfare of medical education or any of its related activities.

Furtherance of Medical Education by the Pharmaceutical Industry

At the 69th Annual Meeting of the AAMC, a resolution was passed whereby the Association would seek to meet with leaders of the pharmaceutical industry to discuss their present programs and strive for devel-

oping a sound program of industry support which provides contributions that are more direct and of greater value to medical education. As a result of these meetings, general principles have now been established by the Pharmaceutical Manufacturers Association and the Association of American Medical Colleges for the guidance of all concerned, since it is desirable and essential that efforts of the industry, in furthering medical education, follow the highest of standards. Distribution of these principles is being made by the Association office as well as by members of the industry.

PRE-CONFERENCE MEETINGS

The 1959 Teaching Institute

A number of important and far-reaching outcomes may be forecast from discussions held at the 1959 AAMC Teaching Institute on October 27–31, at the Edgewater Beach Hotel. Dr. Charles G. Child, II of Michigan served as chairman of this Second Institute on Clinical Teaching.

More and better backgrounds in mathematics and the methods of science, changes in medical school curriculum patterns, and in the role of the internship, the development of a scientific understanding of patient-physician relationships and of improved methods of instruction in the establishment of these all-important relationships —these are a few of the eventualities that the discussions portend.

Recognizing that the physician of tomorrow must be better prepared to incorporate scientific advances into clinical practice throughout his career, the articulation of the basic medical sciences with clinical application and the function of the internship were discussed intensively on the opening day of the Institute. The roles of the university and examining boards in shaping medical education were focused upon during the second day. On the final day, participants concentrated on the relationship between the physician and his patients and on the potential contributions of psychiatrists and other behavioral scientists to developing understanding of these relationships.

Highlights of discussion-group activity will be analyzed in the report of this Institute, which will be published along with data from the 1959 Teaching Institute Workbook and the text of significant papers in the *Journal of Medical Education*.

The Second Institute on Clinical Teaching, seventh in the annual AAMC series of Teaching Institutes, completes the group oriented around the medical educational curriculum. A new series focusing on problems affecting the basic structure and functions of medical education will begin in 1960. Dr. Carlyle Jacobsen will be chairman of next year's Institute, which will consider the effects of changing patterns in medical care on medical education.

Medical School-Teaching Hospital Section of AAMC

Immediately prior to the Annual Meeting, approximately 200 teaching hospital administrators, medical school deans and invited guests convened for the Second Annual meeting of the AAMC Medical School-Teaching Hospital Section.

In the opening session of the meeting, which also carried out the theme, "Medical Education in a Changing World," representatives from Western Reserve University discussed that institution's unique situation with regard to "The Teaching Hospital as a Member of the University Family." Dr. John S. Millis, President of the university, set the stage for the discussions by stating three basic principles which might be considered the basis for all hospital-university relationships; i.e., unity of purpose and action must be consciously desired as an indispensable ingredient in the structure of the university, and if this is so, machinery must be designed to achieve it; cooperation and unity are produced by decisions and actions which are voluntary rather than compulsory; and, finally, adequate communication requires many channels, not on the functional level alone, but on the executive and governing board level as well. Following Dr. Millis' presentation, Dr. Webster Simon, Vice President, Western Reserve University;

Dr. Douglas Bond, the medical school Dean; and Stanley Ferguson, Hospital Administrator, each discussed the role of his area in the total university operation.

In the second panel session, relationships between the teaching hospital, the medical school and the university were discussed from the standpoints of the privately endowed institution vs. that of the publicly supported. Participants included Dr. George N. Aagaard, Dean, and LeRoy S. Rambeck, Hospital Administrator, of the University of Washington (Seattle); and Dr. Edward W. Dempsey, Dean, and Dr. Frank R. Bradley, Director of Barnes Hospital, representing Washington University School of Medicine (St. Louis).

The final session was devoted to the "Fiscal Problems of the Teaching Hospital" which was presented by Ray E. Brown, Director of the University of Chicago Clinics.

Officers of the Section for the coming year are: Chairman, Dr. Donald J. Caseley, University of Illinois; Vice-Chairman, Dr. Albert W. Snoke, representing Yale University; and Secretary (serving second of three-year term); Duane E. Johnson, University of Nebraska. These men will serve on the Executive Committee, along with Dr. Gerhard Hartman, Immediate Past Chairman, State University of Iowa; Dr. J. E. Sharpe, representing the University of Toronto; Dr. Philip D. Bonnet, representing Boston University; and A. J. Binkert, representing Columbia University.

NEWS FROM THE MEDICAL SCHOOLS

Boston

Grants totaling $416,570 have been awarded the university by the Public Health Service for training programs in the treatment of the mentally ill. Of this amount, the medical school's department of medicine, headed by Dr. BERNARD BANDLER, received $108,725 for training in psychiatry. Twenty-five thousand will be used for the teaching program in psychiatry and $83,725 for the residency training program in psychiatry at the Boston University-Memorial Hospitals Medical Center. The NIH has also approved funds to support this program for the next four years.

Cincinnati

The University of Cincinnati's Institute of Industrial Health is offering graduate fellowships in Industrial Medicine. The Institute, which is in the College of Medicine, provides professional training for graduates of approved medical schools who have completed at least one year of internship. The three-year program leading to the degree of Doctor of Industrial Medicine satisfies the requirements for certification in Occupational Medicine by the American Board of Preventive Medicine. Two years are devoted to intensive academic and clinical study in the field of Industrial Medicine. A third year is spent in residency in an industrial medical department or in some comparable organization.

The Institute is also offering graduate training for professional personnel other than physicians, in the field of environmental hygiene (industrial hygiene, air pollution, industrial wastes, industrial toxicology, etc.) The professional training is provided for graduates of approved schools of engineering or science.

Requests for additional information should be sent to the Secretary, Institute of Industrial Health, College of Medicine, Cincinnati 19, Ohio.

Colorado

Approximately 50 specialists from 18 premature infant centers in the United States and Hawaii, met at Colorado Springs recently for the purpose of pooling their research knowledge as to the cause of prematurity, and its prevention. Discussions also centered around the role of the obstetrician and the pediatrician in the operation of a premature infant nursery.

The conference, believed to be the first of its kind ever held, was supported by a grant from the U.S. Children's Bureau and was sponsored by the Colorado State Health Department and the Colorado University School of Medicine. A number of C.U. faculty members were on the program.

Construction has begun on a modern facility to house laboratory animals used in research programs at the C.U. Medical Center. To be located on a 141-acre tract of land 12 miles southeast of Denver, the animal center will be an important addition to research and will be completed without cost to the State of Colorado, utilizing gift and grant funds, according to Dean ROBERT J. GLAZER. The $17,250,000 expansion program for the C.U. Medical Center, still on the drawing boards, includes plans for modern, air-conditioned animal quarters on the Denver campus.

Harvard

The Harvard School of Public Health has received a grant of $1,369,460 by the Department of Health, Education, and Welfare for the first stage in the construction of a nine-story research building. To be erected adjacent to an existing structure, the build-

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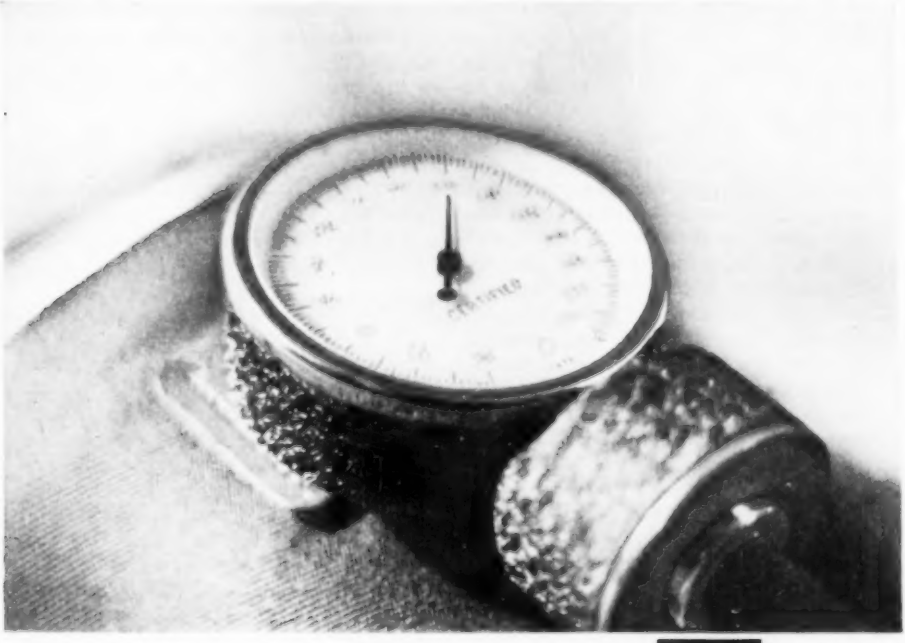

CIBA SUMMIT, NEW JERSEY

ing will house laboratories for research in environmental health and nutrition. Construction is expected to start in mid-1960.

According to the school's dean, Dr. JOHN C. SNYDER, the new research facilities will greatly strengthen the objectives of the School of Public Health aimed primarily at the prevention and control of disease and disability among population groups.

Iowa

A library established in memory of the late Dr. ARTHUR STEINDLER was dedicated November 1, in the department of orthopedic surgery. The physician died last July. He had served as professor and head of orthopedics at Iowa for nearly 35 years before his retirement from the University in 1949, and had then served on the Mercy Hospital staff in Iowa City until his death at the age of 81. According to Dr. CARROLL B. LARSON, Dr. Steindler's successor as professor and head of the department, more than 1,000 volumes from Dr. Steindler's personal collection of books will be placed in the memorial library.

Maryland

A $125,000 grant from the NIH has been made to the department of pathology to support the training of medical students, postdoctoral fellows, and pathology residents in experimental pathology for the next five years. While a training program in experimental pathology had been started in 1956 under the direction of Dr. LESTER KIEFER, assistant professor of pathology, Dr. HARLAN I. FIRMINGER, professor and head of the department, stated that an experimental approach to pathology is needed. He added, few training programs in pathology today include experimental pathology—thus the science of the cause and manifestation of disease has suffered for lack of experimental pathologists.

Medical Evangelists

Dr. EDWARD R. PINCKNEY has been appointed to the newly-created position of executive director of CME's new Audio-visual Postgraduate Extension Courses in Medicine. Dr. Pinckney formerly served on Northwestern University's Medical School faculty as director of the Comprehensive Clinic and was in charge of preventive medicine teaching. While at Northwestern, Dr. Pinckney was also assistant editor of the *Journal of the American Medical Association*. He will continue as editor of *The New Physician*.

The new program, which Pinckney will direct, consists of producing and distributing courses in postgraduate medicine that are recorded on tape and filmstrip. These courses are designed for physicians and doctor groups, including individual practitioners, hospital staffs, medical society meetings, military groups, medical libraries, and overseas missionaries.

Michigan

Dr. C. J. TUPPER and Dr. H. WALDO BIRD have been named assistant deans, effective November 1. Dr. Tupper's activities as director of the periodic health appraisal program for the university faculty and as director of the consultation services of the University Health Service will be adjusted to permit him to devote half of his time to the new post. He will have responsibilities in the general administrative activities of the dean's office.

Dr. Bird will continue as associate professor of psychiatry and will retain his private practice. He will be responsible for student affairs.

Dr. Tupper has been on the faculty since 1954 and Dr. Bird, since 1956.

Pennsylvania

Dr. I. S. RAVDIN has been elected Vice President for Medical Affairs at the University. Dr. Ravdin will continue his surgical practice and teaching duties in the school of medicine as professor of surgery. He was elected to the new position following a year of service as Vice President for Medical Development, an office established on an interim basis following the resignation of the former Vice President for Medical Affairs, Dr. NORMAN TOPPING, who is now president of the University of

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"The new student can be overwhelmed by the maze of nerve cells, nuclei, pathways and levels he is required to study. In an attempt to help him visualize this neuroanatomic material, 37 new illustrations have been added. Twenty-three are in color. The highly schematic, and often greatly enlarged, diagrams of major nervous pathways were designed to provide visual continuity through different levels of the central and peripheral nervous system."—*Preface. By* RAYMOND C. TRUEX, *Professor of Anatomy, Hahnemann Medical College*

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Basmajian: CATES' PRIMARY ANATOMY—*4th Edition*

This new edition of a favorite text in anatomy for nurses, physiotherapists or general college courses emphasizes function in relation to structure. It will be available early in 1960. Orders now being accepted. *By* J. V. BASMAJIAN, *M.D., Professor and Head of the Department of Anatomy, Queen's University, Kingston, Ontario, Canada*

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Baltimore 2, Maryland

Southern California. Dr. Ravdin will be responsible for directing the administrative and academic activities and affairs of the university's medical division, composed of the schools of medicine, graduate medicine, dentistry, nursing, veterinary medicine, and allied medical professions; the Hospital of the University of Pennsylvania, Graduate Hospital, and the Henry Phipps Institute.

Dr. JONATHAN E. RHOADS succeeds Dr. Ravdin as John Rhea Barton Professor of Surgery, chairman of the department of surgery, and director of the Harrison department of surgical research.

S.U.N.Y. Syracuse

Dr. ORREN D. CHAPMAN, former professor and chairman of the department of microbiology, has been made professor emeritus effective from his retirement date of October 1. Dr. Chapman is presently director of the Syracuse Regional Red Cross Blood Program.

Dr. PAUL F. WEHRLE, associate professor of pediatrics, has been named acting chairman of the department of microbiology, filling the vacancy created by the retirement of Dr. Chapman.

Stritch (Loyola Univ.)

Loyola University has reaffirmed its intention to construct a multimillion dollar medical center on a previously acquired 54 acre site near Skokie, Ill. The development includes eventual removal of the university's Stritch School of Medicine from 706 S. Wolcott Avenue in the west side medical center to the new location, which has been incorporated as part of Chicago.

The first unit to be built in the center will be a 300 bed hospital and outpatient department to cost approximately $10 million. Cost of the medical school building to house the basic science departments has been estimated at $7 to $8 million. The new teaching hospital will be started with funds already available. About $3 million more will be needed. The medical school construction will follow. Funds will be solicited from national foundations, corporations, federal government and individual contributors.

Tennessee

Dr. ROLAN H. ALDEN, chief of the division of anatomy at the University of Tennessee Medical Units since 1949, has been named to the newly-created position of associate dean of the graduate school for medical sciences. Dr. Alden will begin his new duties January 1, retaining his position as chief of the division of anatomy. He will be taking over a portion of the duties performed by Dr. T. P. Nash, Jr., dean of the School of Biological Sciences. Dr. Nash will continue in his position as dean. He has served in that capacity since the school was organized in 1928, at which time it also began functioning as a graduate school.

Tufts

Dr. HENRY BAKER, professor of clinical medicine, was chosen president-elect of the American College of Gastroenterology at the annual meeting of the College in Los Angeles recently. He will assume the presidency at the annual meeting to be held in Philadelphia, Pa., in October, 1960.

U. of Washington (Seattle)

Dr. JOHN R. HOGNESS, medical director of the University of Washington Hospital, has been named assistant dean of the school of medicine. He will continue as the hospital's medical director, dividing his time between the two positions.

Hogness succeeds Dr. JAMES W. HAVILAND, who resigned the position to devote full time to his practice. He will however, retain his voluntary appointment as clinical professor of medicine and will continue to participate in the teaching program.

Wayne State

Dr. FERDINAND E. GREIFENSTEIN has accepted an invitation by the China Medical Board to become visiting professor at two Japanese medical colleges. Dr. Greifenstein is chairman of the department of anesthesiology. He will teach at the medical schools of Keio University and Kyushu University.

An important psychological study of a change in medical education—

Teaching Comprehensive Medical Care

by Kenneth R. Hammond, Fred Kern, Jr., M.D., and Others
Foreword by Ward Darley, M.D.

IN 1953 the University of Colorado initiated an outpatient facility, called the General Medical Clinic, for the purpose of teaching and demonstrating the principles of comprehensive medical care to senior students. The experimental clinic to which half the class was assigned (the other half continued in the traditional curriculum as a control group) was initiated in a spirit of scientific inquiry—to be studied and evaluated objectively.

The Behavior Research Laboratory of the University undertook to study the effects of the Clinic in relation to the regular senior course of study. This book reports in detail the structure of the Clinic, the manner in which it functioned, and a detailed analysis of the two teaching programs. Studies of individual differences among students are also reported, and related to the various objects of the project.

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ITEMS OF CURRENT INTEREST

Big Ten Universities to Analyze Medical Education in Mid-West

An intensive study of medical education in the Middle West has been proposed by Big Ten universities and the University of Chicago. The joint effort will be financed by the Committee on Institutional Cooperation of the Council of Ten and the University of Chicago. (Only Purdue and Michigan State universities do not have medical schools.)

Held in connection with the 70th annual meeting of the AAMC, the plan was unveiled following a meeting in Chicago of C.I.C. staff members with medical deans of the group and the research staff of the Association of American Medical Colleges.

According to Dr. Henning Larsen, staff director for the Committee, "Chief purposes of the project are to better understand prospects for cooperation among our universities and to present an accurate story of institutional accomplishments in medicine to our clientele." He added, "Such a study should emphasize the great need in the face of the tremendous expansion necessary to keep pace with the population growth."

Studies of the Committee on Institutional Cooperation are being financed by the Carnegie Corporation of New York. Chief objectives of the Committee are to collect and analyze information concerning cooperative efforts of the eleven universities and to indicate areas where further cooperation can increase the effectiveness of the institutions.

National Foundation Offering Fellowships

The National Foundation announces the availability of fellowships for clinical study in arthritis and related diseases for physicians who have an interest in rheumatic diseases and who intend to apply their knowledge of these diseases to clinical service, teaching, or research. Only physicians, licensed, or eligible for licensure, to practice in the United States and who have had at least two years of specialty training acceptable to the appropriate American Board (or equivalent training) are eligible. All applicants must be citizens of the U.S.

Further information may be obtained by writing to the Division of Scholarships and Fellowships, Department of Professional Education, The National Foundation, 800 Second Ave., New York 17, N.Y.

Carnegie Institute Offering New Curriculum

Recognizing the growing need for trained laboratory personnel in biological sciences, the Carnegie Institute of Technology is offering a new curriculum leading to a degree of Bachelor of Science in Bacteriology.

The new program will prepare the student for career positions in the medical, industrial, and food microbiology fields. It also affords preparation for specialized graduate work in bacteriology, chemistry, and related fields. Dr. Duane T. Maunder heads the department of biological sciences.

Book Company Names Three Doctors to Editorial Board

The Medical Book Department of Little, Brown and Company announced the appointment of three members to its Editorial Board who join Dr. Chester S. Keefer, director of the Boston University-Massachusetts Memorial Hospitals Medical Center. They are: Dr. Warren H. Cole, professor of surgery, University of Illinois College of Medicine; Dr. Joseph F. Ross, professor of medicine and associate dean, University of California School of Medicine (Los Angeles); and Dr. Irving S. Wright, professor of clinical medicine, Cornell University

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Medical College. Dr. Keefer will serve as chairman of the Board.

Government Notes

Department of the Army, Office of the Surgeon General. . . . The Calcutta School of Tropical Medicine and Hygiene in India will be a training ground for Army preventive medicine specialists in an agreement recently concluded by the U.S. Army Medical Service and the School. Through this arrangement, Dr. R. N. Chaudhuri, dean of the School of Tropical Medicine and Hygiene, will accept an Army physician as a resident observer on his staff for three months with spaces rotating among Army internists, preventive medicine officers, and occasionally other clinical specialists. Major Jerome H. Greenberg, MC, a preventive medicine officer in the Army Surgeon General's Office, will be the first participant in the program at the Calcutta School of Tropical Medicine and Hygiene.

USAF Aerospace Medical Center. . . . Dedication ceremonies for the Aerospace Medical Center at Brooks AFB, San Antonio, Texas, were held November 14. Sen. Lyndon B. Johnson addressed the assembled military and scientific leaders. The ceremonies followed a two-day cardiology symposium during which heart specialists discussed recent research on heart diseases.

Department of HEW. . . . Surgeon General Leroy E. Burney of the Public Health Service announced the transfer of the policy, planning and staff functions of the Service's international health program to the Office of the Surgeon General. Dr. H. van Zile Hyde, assistant to the Surgeon General for International Affairs, will be Chief of the Division. The International Education and Exchange program of the present Division of International Health will be retained in the Bureau of State Services as part of the Division of General Health Services, which presently administers the Public Health Service's training program for public health workers in this country.

Apprenticeship in 1815

My father during the early part of his apprenticeship had to make up bottles of medicine, roll out pills, fill small pots with ointment, and spread blisters and warming plasters. After 17 he had to attend patients who were ill, and he also attended a very large number of what the late Mr. Albert Smith called "Census increasing cases." He was, therefore, what was called an unqualified assistant, but, of course, such a person cannot now be legally employed. As the practice was eminently what is called a country one, most of his visiting was done on horseback, and I have heard him say that he returned from some of his journeys so fatigued that, after unsaddling the faithful animal which had conveyed him on his long journeys, he lay down in the straw and slept in the stall during the remainder of the night.

—Preston (*Sixty-four Years A Doctor: Reminiscences of Sir Charles Brown, An Octogenarian Lancashire Doctor*), London, George Toulmin & Sons Ltd., 1922, pp. 1-2.

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PHYSIOLOGIST: Full time appointment in physiology department of large medical school. M.D. or Ph.D. with training and research interests in cardiovascular physiology. Rank and salary (Instructor to Associate Professor, starting $6400 to $9000 plus, respectively) based on qualification and experience. Insurance, pension, travel allowance, relocation, other benefits. To assume post September 1. Address: V-80.

ANESTHESIA RESIDENCIES: Announcing four appointments for residency in anesthesiology in approved department of anesthesia, University Hospitals of Cleveland, Ohio, beginning January 1, 1960, for graduates of approved medical schools or ECFMG-qualified applicants. Additional appointments for July, 1960. Stipend and other information may be obtained by writing Robert A. Hingson, M.D., Director of Anesthesia, University Hospitals of Cleveland and Professor of Anesthesia, Western Reserve University School of Medicine, 2065 Adelbert Road, Cleveland 6, Ohio.

PHARMACOLOGIST: Ph.D. Position available in a medical research institution devoted entirely to research work. Current problems deal with hematopoietic mechanism and arteriosclerosis. No immediate teaching, but possibility in the future if interested. Write to: Director, Toledo Hospital Institute of Medical Research, 2805 Oatis Avenue, Toledo 6, Ohio.

BIOCHEMIST: Ph.D. Trained in protein chemistry, for research institute work on isolation of regulators concerned with the mechanism of hematopoiesis. Address inquiries to: Director, Toledo Hospital Institute of Medical Research, 2805 Oatis Avenue, Toledo 6, Ohio.

PSYCHIATRIST: Board certified or Board eligible, to act as a consultant to state mental health clinics, plan education programs for clinic personnel, to assist communities in organizing mental health clinics, to teach medical students and psychiatric residents concerning the field of community mental health, and to organize and participate in research on problems in community mental health. Interest in child psychiatry desirable. Position carries a professorial appointment in the medical school. Rank and salary according to qualifications. Address: Paul E. Huston, M.D., Chairman, Department of Psychiatry, College of Medicine, State University of Iowa, Iowa City, Iowa.

PEDIATRICIAN: Full-time teaching and research. Interested candidates please send complete curriculum vitae and recent photograph to Dr. J. M. Severens, Creighton University School of Medicine, Omaha 2, Nebr.

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Information for these columns should reach the Personnel Exchange, Journal of Medical Education, 2530 Ridge Avenue, Evanston, Illinois, not later than the 10th of the month which precedes the month in which the listings will appear.

Personnel Available

INTERNIST-HEMATOLOGIST: Age 36, Board certified, with five years academic-type practice and previous research experience, seeks academic position in moderate sized city. Address: A-399.

PSYCHIATRIST: Female, age 26, completing final year of residency in June 1959. Training includes two years in an active university program and participation in family studies in schizophrenia. Analytically (Sullivanian) oriented. Special interests: Psychotherapy with schizophrenics, teaching professionals and non-professionals, liberal arts. Seeks position teaching in medical school with time for limited private practice. Interested in small university community. Address: A-400.

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INTERNIST: M.D. Age 33. Currently on faculty of eastern medical school. Experience in private practice and industrial medicine. Eight months experience and training in psychiatry. Desires faculty appointment with opportunity for clinical investigation in cardio-vascular diseases, as well as teaching general medicine, in teaching hospital. Address: A-402.

VETERINARIAN: Experienced in microbiological techniques; presently at a medical school. Desires position as director of experimental animal laboratory. Address: A-404.

MICROBIOLOGIST-VIROLOGIST: Ph.D., presently on university faculty. Five years experience in virology and tissue culture publications. Desires academic position involving full-time research or research and teaching. Address: A-405.

ORTHOPAEDIC SURGEON: 38. Wants appointment in U.S.A. or Canada. Main interest in Traumatic Surgery and Research. Now holding consultant post at well known British Hospital. Mastership in Surgery and Fellow of the Royal College of Surgeons. Address: A-406.

PSYCHIATRIST-NEUROPHYSIOLOGIST: M.D. Certified in psychiatry and as a mental hospital administrator. FAPA and FSPA. No formal training in neurophysiology but using some of its principles with gratifying results in coping with the manifold problems of psychosomatic medicine. Desires full-time career teaching position in medical school with opportunities for teaching psychiatry; for learning clinical neurophysiology well enough to instruct; and for carrying on more intensive course of clinical investigation. Address: A-407.

PHYSIOLOGIST: Ph.D., 1957, age 31, married, one child. Research in cardiovascular-renal physiology. Strong background in hypertension. Eleven publications. Experience in teaching medical, dental, and pharmacy students. Desires research position with or without teaching responsibilities. Address: A-408.

MICROBIOLOGIST: Ph.D., Sept., 1959. Training in all fields of basic microbiology with research in microbial metabolism. Desires faculty position with teaching and research opportunities in a university or medical school. Address: A-409.

PHYSIOLOGIST-ENDOCRINOLOGIST: Ph.D., age 36. Training and background in endocrine, cellular, mammalian and zoological physiology. Presently assistant professor engaged in teaching and research in endocrinology and general physiology. Formerly research associate in biochemistry. Desires academic and/or research position. Address: A-410.

ANATOMIST: Age 34, married. Ph.D. Anatomy 1957. Publications. Teaching experience in Eastern medical school. Desires teaching position with opportunity for research. Address: A-411.

INTERNIST: Age 35, married. Ten years training in internal medicine and hematology. Teaching experience and research in field of clinical hematology, B_{12} metabolism, radioactive uptakes, experimental hematology, and enzyme studies. Desires teaching position with opportunity for research. Address: A-412.

SURGEON: Age 35, native of Bombay, India. In U.S. since 1952. F.C.P.S. (Bombay), F.R.C.S.E. (Edinburgh). Completed residency training in general surgery in U.S. and successfully taken Part I examination of American Board of Surgery. Desires full-time position in teaching and/or research in American medical school. Presently senior resident in surgery in Eastern hospital. Experience in plastic surgery as well as urology and anesthesiology. Address: A-413.

UROLOGIST: University trained, finished 1956. Seeking full-time academic post: teaching, research, and clinical work. Presently in private practice and part-time university teaching. Address: A-414.

GROSS ANATOMIST: D.S.D., Ph.D. Ten years teaching experience in medical school; previously taught in dental school. Clinical experience in plastic and oral surgery. Research interests and publications: homotransplantation of tissues. Desires academic position in medical or dental school with research facilities. Will consider research associateship with plastic surgery department. Address: A-415.

MICROBIOLOGIST: Ph.D. Seeking position on medical school faculty in Southeast or Southwest. Many years experience and supervision in clinical microbiology. Six years on medical school faculty. Qualified in parasitology, virology and public health. Address: A-416.

[*Continued on p. xlvi*]

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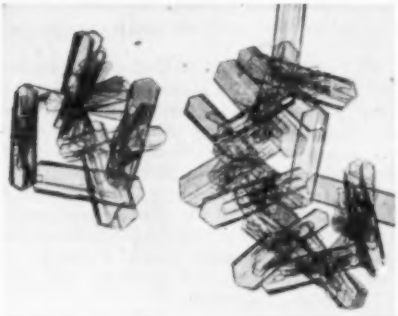

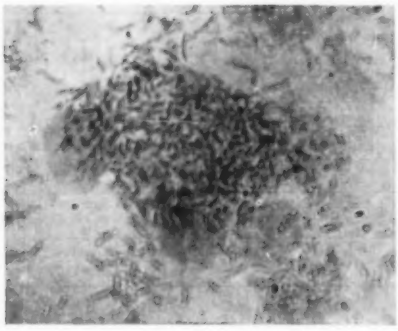

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MICROBIOLOGIST-CLINICAL PATHOLOGIST: M.D., Ph.D., age 54, married. Wide experience in teaching and research in the United States. Returning after several years of teaching in medical schools in the Far and Middle East. Textbook in course of publication. Desires research or teaching position in medical school or in teaching hospital. Address: A-420.

PATHOLOGIST-VIROLOGIST: DVM, Ph.D. Experience in comparative pathology, virology and tissue culture techniques. Also considerable experience in teaching experimental pathology to medical students. Desires teaching appointment in a medical school that would provide opportunity for completion of courses leading to M.D. degree. Address: A-421.

PSYCHIATRIST: Board certified, with training in both general clinical psychiatry and public health psychiatry (M.P.H. degree). Six years' experience in administering a community-oriented psychiatric training program in an academic setting. Broad range of personal service in teaching, supervisory, and consultative capacities. Dynamic orientation. Numerous research publications. Age under 40. Currently assistant professor at medical school. Desires full-time faculty appointment at higher level. Address: A-422.

PSYCHIATRIST: Board certified in psychiatry and child psychiatry (pending). Eight years experience in teaching at student and resident level in adult and child psychiatry in academic setting. Broadly experienced in teaching, supervisory, and consultative capacities. Analytic orientation. Nine publications. Experience in administering child guidance clinic and in community aspects of psychiatry. Has held position as associate professor of psychiatry; wishes to head up division of child psychiatry in medical school in either true or geographic full-time position. Metropolitan area preferred. Age 45; married; 4 children. Address: A-423.

PHYSIOLOGIST-PHARMACOLOGIST: M.D., Ph.D., age 40. Teaching and research experience includes six years in pharmacology and six years in physiology, with one year training in laboratory of high polymer chemistry. Desires academic and research position in physiology or pharmacology department. Address: A-424.

INTERNIST: Board certified, university trained, with one year training in clinical cardiology and one year in cardiovascular laboratory. Presently holding position as university instructor. Desires faculty appointment with teaching and research in clinical cardiology and electrocardiography. Address: A-425.

ANATOMIST: Ten years teaching experience; all phases of medical school anatomy. Broad research interests with grant support in gross anatomy and histology. Desires university appointment. Northeast or northwest preferred. Address: A-426.

ZOOLOGIST: Ph.D., age 43, married, family. Desires teaching microanatomy in medical school. Experience: medical school teaching (medical parasitology); USPHS senior assistant scientist, foreign experience as malariologist; undergraduate teaching, including 6 years instruc ing pre-medical students in histology. Publications, active research program; current interest: histochemistry techniques in study of cellular basis of resistance to a parasitic infection. Willing also to instruct in parasitology, if situation permits. Available with one semester notice to present employer. Address: A-427.

ANATOMIST: M.B., Ch.B. (Witwatersrand, Johannesburg, South Africa), F.R.C.S. (Edinburgh). Age 52, desires position in medical school as senior lecturer in anatomy. Presently located at University of The Witwatersrand as official lecturer in anatomy; part-time senior lecturer in gross and applied anatomy since 1949. Publications. Surgeon to Union Defence Forces, 1940–46 with rank of major. In private practice as a general surgeon since 1946. Address: A-428.

PEDIATRICIAN: Age 40, married, 3 children, 7 years in general practice, 5 years in academic pediatrics as assistant professor. Emphasis on clinical teaching, growth and development research, and the handicapped child. Seeks relocation at associate professor level. Excellent references. Available in summer of 1960. Address: A-429.

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The Teaching of Anatomy and Anthropology in Medical Education (Report of the 1955 Teaching Institute).

The Appraisal of Applicants to Medical School (Report of the 1956 Institute).

The Ecology of the Medical Student (Report of the 1957 Institute).

Report of the First Institute on Clinical Teaching (Report of the 1958 Institute).

Medical Audio-Visual Institute Publications

Film Catalog, Fall 1955 and Supplements.

Films in Psychiatry, Psychology and Mental Health (available from the Health Education Council, 92 Belmont Drive, Livingston, N.J.).

Films in the Cardiovascular Diseases (Part I available from the American Heart Assn.), 44 E. 23rd St., New York 10, N.Y. ($2.00).
Part II available from the Medical A-V Institute ($2.00).

Publications of Related Organizations

Hospitals Participating in the Matching Program 1959 (NIMP).

Results of the Matching Program 1959 (NIMP publication).

The Student and the Matching Program 1959 (NIMP publication).

Medical College Admission Test—Bulletin of Information 1959 (Educational Testing Service publication).

Psychiatry in Medical Education—1951 Conference ($1.00).

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1. Macy, I. G.; Kelly, H. J., and Sloan, R. E.: with the Consultation of the Committee on Maternal and Child Feeding of the Food and Nutrition Board, National Research Council: The Composition of Milks, National Academy of Sciences, National Research Council, Publication 254, Revised 1953. 2. Research Laboratories, Mead Johnson & Company.

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